DRAFT

ENVIRONMENTAL ASSESSMENT
For Issuing an Exempted Fishing Permit for the Purpose of Testing Salmon Excluder Devices in the Eastern Bering Sea Pollock Fishery

May 2003

Lead Agency: National Marine Fisheries Service
Alaska Regional Office
Juneau, Alaska

Responsible Official: James W. Balsiger
Regional Administrator
Alaska Regional Office

For Further Information Contact:
Melanie Brown, Alaska Regional Office
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802
(907) 586-7228

Abstract: This Environmental Assessment (EA) provides an analysis of alternatives to issue an exempted fishing permit (EFP) for the purpose of testing salmon excluder devices in the pollock trawl fishery of the Bering Sea. The experiment would be conducted in the fall of 2003 for chum salmon and in the spring of 2004 for chinook salmon. The pollock trawl industry has exceeded the chinook and non-chinook bycatch limits in the Bering Sea in the past and is likely to exceed these limits in the future, unless changes in fishing practices are made. Exceeding the salmon bycatch limits in the pollock trawl fishery can affect the locations available to pollock fishing vessels which may result in additional costs to the industry. The successful development of a salmon excluder device for pollock trawl gear may result in reductions of salmon bycatch and potentially reduce costs associated with the harvest of pollock. The proposed action is not expected to have significant impacts on the human environment.

(This page intentionally left blank)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The purpose of this action is to allow the testing of salmon excluder devices in the Eastern Bering Sea pollock trawl fishery. Chinook salmon *Oncorhynchus tshawytscha* and non-chinook salmon (primarily chum salmon *O. keta)* are caught incidentally in Alaska groundfish fisheries, primarily in the walleye pollock *Theragra chalcogramma* trawl fishery. Salmon are a prohibited species in the groundfish fisheries (50 CFR 679.21) with annual limits placed on the number of chinook and non-chinook salmon taken in the Bering Sea and Aleutian Islands (BSAI) trawl fisheries. In 2003, the chinook salmon prohibited species catch (PSC) limit for the BSAI trawl fisheries is 33,000 fish and the non-chinook salmon PSC limit in the Catcher Vessel Operating Area (CVOA) is 42,000 fish between August 15 and October 14. Exceeding these limits triggers the closing of salmon savings areas (50 CFR part 679 Fig. 8 and Fig. 9) for certain time periods to allow for protected areas for the salmon. Pollock also occurs in the salmon savings areas, and closure of these areas may result in added expense to the pollock fishing industry. The 2004 and beyond PSC limit for chinook salmon is 29,000 fish. Based on historical bycatch rates, this amount will likely be exceeded, resulting in the closure of the Chinook Salmon Savings Area. A salmon excluder device would lessen the potential for exceeding the PSC limits and would reduce the potential for constraints being placed on the trawl fisheries due to exceeding salmon PSC limits.

In order to conduct the testing, an exempted fishing permit (EFP) is required. The applicants for the EFP have worked with the Alaska Fisheries Science Center to develop a scientifically sound experiment to test the excluder devices. Exemptions from fishery regulations regarding total allowable catch (TAC) and PSC limits and the closures of the salmon savings areas are needed to permit the collection of data required to successfully complete the tests. Based on the need to conduct the work in a scientifically acceptable manner, the alternatives for this proposed action are limited to the status quo (Alternative 1) and issuing the EFP (Alternative 2, preferred alternative).

The analysis of implementing both alternatives determined that there would be no significant impacts on the human environment beyond those already identified in previous analyses. The impact of future actions under Alternative 2 could potentially be beneficial economically to those involved in the pollock fishery. However, the amount of future use of the salmon excluder devices cannot be determined, and therefore, the significance of future impacts cannot be determined. Alternative 2 is preferred over the status quo because it will allow for the testing of the salmon excluder devices in a scientifically acceptable manner, potentially leading to the reduction of salmon bycatch in the pollock trawl fishery.

1.0 PURPOSE AND NEED FOR ACTION

The purpose of this action is to allow the testing of salmon excluder devices in the Eastern Bering Sea pollock trawl fishery. Chinook salmon *Oncorhynchus tshawytscha* and non-chinook salmon (primarily chum salmon *O. keta)* are caught incidentally in Alaska groundfish fisheries, primarily in the walleye pollock *Theragra chalcogramma* trawl fishery. Salmon are a prohibited species in the groundfish fisheries (50 CFR 679.21) with annual limits placed on the number of chinook and chum salmon taken in the BSAI trawl fisheries. In 2003, the chinook salmon prohibited species catch (PSC) limit for the BSAI trawl fisheries is 33,000 fish and the non-chinook salmon PSC limit in the Catcher Vessel Operating Area (CVOA) is 42,000 fish between August 15 and October 14. Exceeding these limits triggers the closing of salmon savings areas (50 CFR part 679 Fig. 8 and Fig. 9) for certain time periods to allow for protected areas for the salmon. Pollock also occurs in the salmon savings areas, and closure of these areas may result in added expense to the pollock fishing industry. The 2004 and beyond PSC limit for chinook salmon is 29,000 fish. Based on historical bycatch rates, this amount will likely be exceeded, resulting in the closure of the Chinook Salmon Savings Area. A salmon excluder device would lessen the potential for exceeding the PSC limits and reduce the potential for constraints being placed on the trawl fisheries due to exceeding salmon PSC limits.

1.1 Project Area

The experiment is limited to the Eastern Bering Sea management area in the portions commonly used by catcher vessels to harvest pollock. Areas where the experiment will be conducted include locations in the Chum Salmon Savings Area (Figure 1.1) and the Chinook Salmon Saving Area. (Figure 1.2). One of the reasons for the need for the exempted fishing permit for this experiment is to permit the experimental trawling in the salmon savings areas, regardless of closure status.

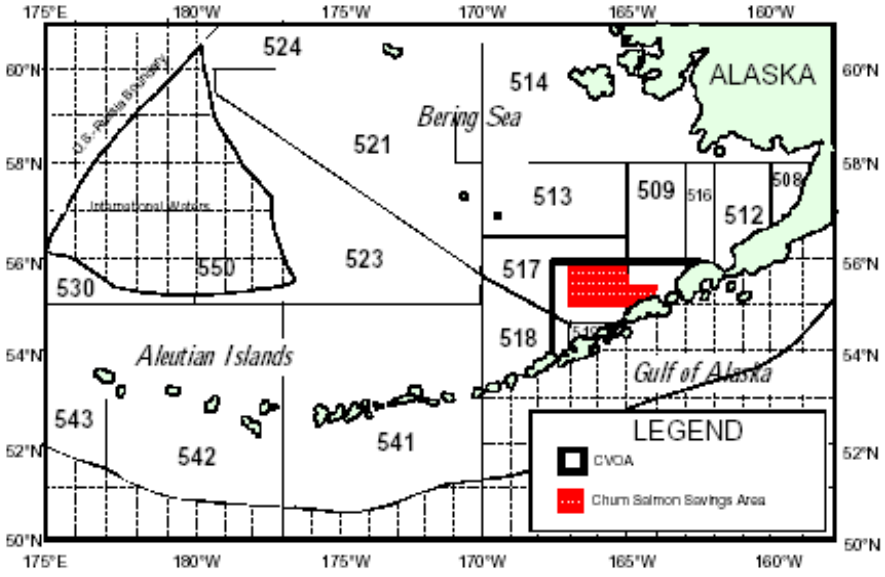


Figure 1.1 Chum Salmon Savings Area

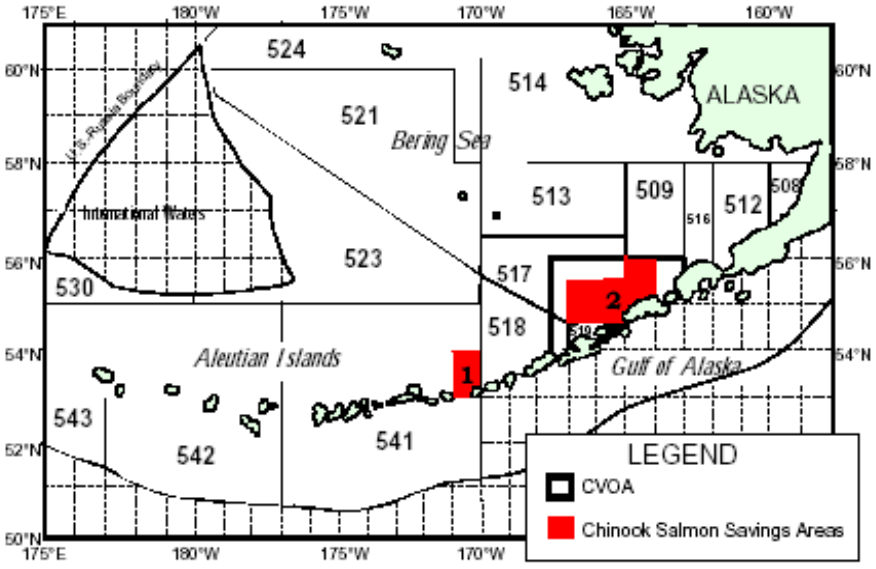


Figure 1.2 Chinook Salmon Savings Area.

1.2 Background

This section provides historical information regarding salmon bycatch in the pollock trawl fishery and provides the basis for the need to develop methods for reducing salmon bycatch. Most of the text in section 1.2.1 through 1.2.6 is from the application for the EFP (UCBA 2003).

1.2.1 Historical Salmon Bycatch Information

From 1990-2002, an average of 37,795 chinook salmon and 69,680 other salmon species (> 95% are chum salmon) were incidentally caught annually in BSAI groundfish trawl fisheries (Table 1.1). Bycatch is primarily juvenile salmon that are one or two years away from returning to the river of origin as adults.

Table 1.1 Bycatch of Pacific Salmon in Alaska Groundfish trawl fisheries

Bering Sea and Aleutian Islands Area

	Numbers of Fish	
Year	Chinook	Chum
1990	14,085	16,202
1991	48,873	29,706
1992	41,955	40,090
1993	45,964	242,895
1994	44,380	95,978
1995	23,079	20,901
1996	63,205	77,771
1997	50,218	67,349
1998	58,966	69,237
1999	14,586	47,204
2000	8,219	59,306
2001	40,303	60,460
2002	37,507	78,739
Average	37,795	69,680

Source: NMFS Alaska Region website

Pacific salmon support large commercial, recreational, and subsistence fisheries throughout Alaska. Over the last four years, chinook and chum salmon runs in western Alaska have been at relatively low levels compared to runs observed over the last 20 years. Although these reduced salmon runs appear to be attributable to changes in ocean conditions (Hare and Francis 1995; Kruse 1998), considerable public concern has been raised as to the effect of low salmon returns on fishery dependent communities in western Alaska. Responding to the crisis in the salmon industry, the Governor of Alaska has declared a state emergency on several occasions over the last four years. In response to the Governor's concerns, the North Pacific Fishery Management Council (Council) has reviewed on several occasions the bycatch management measures in place

to reduce salmon bycatch to the extent practicable, as required by the Sustainable Fisheries Act of 1996 (NPFMC 1999c).

In 2002, the Council reviewed a retrospective analysis of salmon bycatch trends and estimated effects of Alaska groundfish trawl fisheries on salmon returns in Alaska (Witherell et al 2002). This evaluation of the possible bycatch effects concluded that bycatch in groundfish fisheries reduced western Alaska chinook salmon runs by less than 2.7%. Salmon taken incidentally in these fisheries are known to originate from Alaska and Pacific northwest runs, as well as Asia and Russia. While this is clearly a small percentage effect on fish bound for Alaskan river systems, the effect is nonetheless considered to be slightly greater than the estimated effect of Alaskan groundfish fisheries on other prohibited species in federal waters fisheries off Alaska, such species as Pacific halibut and several species of king and tanner crabs (Witherell et al. 2002).

1.2.2 Costs Associated with Salmon Bycatch

Since seasonal bycatch caps have been in place, pollock fishermen have incurred substantial costs to control salmon bycatch. The industry believes that the cost of these salmon avoidance measures is high under the current set of seasonal bycatch caps. DO we have anything quantitative here??) Costs could increase further as the phased-in reduction of chinook salmon bycatch are implemented through 2004.

Costs associated with salmon avoidance go beyond the simple time and fuel costs incurred by moving vessels to alternative fishing areas. At times, pollock catch rate and/or the abundance of fish in optimal size ranges is highest in areas where salmon are concentrated. The costs of not being able to conduct fishing in those areas often exceed the costs of moving to alternative fishing areas according to industry sources (UCBA, 2003).Can we get more info on this??

This discussion of costs of existing methods to control salmon bycatch illustrates the potential value of a bycatch reduction device (BRD) to the pollock fishing industry. If a BRD is successful at reducing salmon bycatch with relatively low escapement of pollock, such a device would allow pollock fishermen to avoid or reduce the costs of moving and searching for an alternate fishing location or sacrificing good fishing conditions. An effective BRD might not only reduce such costs but could actually increase product quality and per unit revenues in conditions where the most valuable pollock are located in areas where salmon are relatively concentrated. If the performance of the device proved to be exceptional, then the effects of the salmon bycatch control measures, both the fishery management controls and the industry controls, might be avoided entirely.

Benefits to consumers and the country overall from the pollock fishery could also increase under the expectation that the benefits of efficiency gains and increased product quality would accrue to consumers and the nation. Additionally, although the estimated environmental effect of salmon bycatch on salmon runs in Alaska are thought to be minimal, the reduction in these effects would create some expected benefits for commercial and recreational fishermen, Alaskan

natives and tribal values associated with salmon, and salmon management and conservation goals. In years where salmon returns are relatively low, bycatch effects on salmon runs, however minimal those effects might be, would be avoided to the timely benefit of those runs.

These environmental benefits are based on the assumption of minimal injury to salmon utilizing the escapement device. Any evaluation of the performance of salmon bycatch reduction device and its costs and benefits would clearly need to explicitly evaluate the question of long term survival in order to assess actual benefit/cost tradeoffs. The expectation of benefits from a BRD also assumes that changes in fishing behavior as a result of widespread use of the device would not increase some other potential environmental costs associated with the fishery.

1.2.3 Existing Fishery Management Bycatch Reduction Measures

Salmon are listed as a prohibited species in the groundfish fishery management plans, meaning that they cannot be retained and sold. Regulations implemented in 1994 prohibited the discard of salmon taken as bycatch in BSAI groundfish trawl fisheries until the number of salmon has been determined by a NMFS certified observer (59 FR 18757, April 20, 1994). Subsequent regulations allowed for voluntary retention and processing of salmon for donation to NMFS qualified distributors of food to underprivileged individuals (§ 679.26).

Bycatch of chinook salmon in Alaska groundfish fisheries is generally higher in the winter and chum salmon bycatch is higher in the summer although this trend is not without exceptions. Based on this seasonal pattern, the Council has adopted extensive seasonal cap and closure measures to control bycatch of salmon in trawl fisheries (Witherell and Pautzke 1997). Regulations establish closures for several areas with historically high bycatch of salmon if the seasonal cap (number) of salmon is taken as bycatch. Beginning in 1994, the Chum Salmon Savings Area (Fig. 1.1) has been closed to all trawling from August 1 through August 31 (§ 679.22(a)(10)). Additionally, the area re-closes after August 31 if a bycatch threshold limit of 42,000 non-chinook salmon is caught incidentally in the CVOA between August 15 to October 14 (§ 679.21(e)(7)(vii)).

From 1996 through 1999, regulations were in place to prohibit trawling in the Chinook Salmon Savings Areas (Fig. 1.2) through April 15, if and when, a bycatch limit of 48,000 chinook salmon was attained in the BSAI trawl fisheries (§ 679.21(e)(7)(viii)). More than 48,000 chinook salmon were taken as bycatch annually from 1996 through 1998, but closures were not triggered because bycatch limits were not exceeded before April 15.

In 2000, new regulations to reduce chinook salmon bycatch in BSAI trawl fisheries were implemented (65 FR 60587, October 12, 2000). The regulations incrementally reduced the bycatch limit for the pollock fishery from 48,000 to 29,000 chinook salmon over a 4-year period and implemented year-round accounting of chinook salmon bycatch in the pollock fishery (§ 679.21(e)(1)(vii)) . Additionally, the boundaries of the Chinook Salmon Savings Areas were modified. Under these modifications, in the event the limit is triggered before April 15, the Chinook Salmon Savings Area closes immediately. The closure would be removed on April 16,

but would be reinitiated September 1 and continue through the end of the year. If the limit were reached after April 15, but before September 1, then the areas would close on September 1. If the limit were reached after September 1, the areas would close immediately through the end of the year (§ 679.21(e)(7)(viii)). The bycatch limit for the BSAI pollock fisheries is 33,000 chinook salmon in 2003 and 29,000 chinook salmon in 2004.

1.2.4 Fishing Industry Initiatives To Control And Reduce Salmon Bycatch In Groundfish Fisheries

Over the last ten years, the pollock industry has developed voluntary controls on bycatch of salmon and initiatives to collect and analyze samples for genetic analysis to improve information on country of origin. Efforts have also been undertaken to evaluate temperature and other environmental data collected routinely by industry for information on how these variables are associated with salmon bycatch. Can we have a cite here??

Starting in the early 1990s, several programs employing location-specific bycatch avoidance data exchanges between fishermen were implemented by the pollock industry. These programs use fishery observer data on a fast-turn-around basis so fishermen can more effectively avoid bycatch "hotspot" locations. These early efforts were formally adopted into agreements between pollock fishing cooperatives that were established through the American Fisheries Act (AFA) of 1998. The individual incentives and accountability through internal private contracts within pollock fishing cooperatives established under the AFA have increased the effectiveness of industry bycatch management systems. (Cite??)

Industry efforts to control and reduce salmon bycatch have resulted in tangible improvements in fishery performance. The nature of the bycatch problem with salmon, however, is exceedingly complex and inherently difficult due to the unpredictable nature of salmon locations and movements. From a practical perspective, the pollock industry believes that one of the biggest problems with salmon avoidance is that hotspots are often transitory. By the time such concentrations are identified, a relatively large number of salmon may have already been taken and salmon may have already moved to other locations. Overall, hotspot avoidance and other approaches have provided some success, but these efforts can only achieve success to the degree that salmon movements (and hence bycatch) follow some sort of predictable pattern (UCBA 2003).

The challenges of salmon bycatch avoidance itself, particularly in the context of the restrictive bycatch management measures in place in the BSAI fishery management plan (FMP) create a significant problem for the pollock industry. This situation will undoubtedly be even more acute if salmon populations increase or environmental conditions change in the future to increase the overlap of chinook and chum salmon feeding and migration routes with fishing grounds used for pollock fishing. The potential effects of existing management controls on salmon bycatch can be seen in the fact that the analysis prepared in support of the decision to reduce the chinook bycatch cap determined that had the cap of 36,000 salmon (an amount far in excess of what the cap will be once the phased-in reduction to 29,000 is complete) been in place during the 1994-

1997 period, such a cap would have been triggered three of the four years for which data were available. This would have been expected to reduce the pollock catch in those years by 7-28% (NPFMC 1999c).

One further complication is that salmon avoidance is not the only constraint facing the pollock industry. The decision of where to fish is affected by other constraints. An important constraint on where pollock vessels might fish in order to avoid salmon are regulations governing pollock removals and fishing locations so as to minimize potential competition with Steller sea lions. To avoid harvesting more than the allowable amount of pollock in Steller sea lion protection areas, fishing areas must be selected outside of Steller sea lion protection areas, even when salmon bycatch was relatively low in those areas. In some cases, this tradeoff can mean higher incidental catch rates of salmon.

Trawl skippers have informally developed and tested excluder devices for bottom trawls for many years. Little or no informal effort has been focused on designing a salmon excluder device for pelagic trawls used in the BSAI pollock fishery. One explanation for this is that up until recently, the industry did not have access to the technical expertise and equipment to capture video images *in situ* where low-light conditions make this difficult. Another may be that the bycatch rates are usually lower in the pelagic trawl fishery compared to the bottom trawl fishery.

1.2.5. Purpose And Need For An Exempted Fishing Permit To Develop A Salmon BRD Device And Evaluate Its Performance

Exempted fishing permits are an effective way to develop bycatch reduction gear allowing for systematic testing under a rigorous experimental design. In the experience of the fishing industry, informal efforts to test net modifications in an *ad hoc* manner are not often productive because a fishermen working independently typically does not subject his modification ideas to systematic testing. While fishermen often possess a strong grasp of technical aspects of fishing gear in combination with outstanding ingenuity for adaptation, the coordinated and systematic approach of testing gear modifications through an EFP collaboration of science and industry is a more productive way to develop BRDs.

EFPs offer advantages given the relatively high cost of research charters on the scale of vessels primarily used in the BSAI pollock fishery. Because harvest limits are typically set below the acceptable biological catch (ABC) limits in the Federal fisheries off Alaska, additional fishing opportunities can be used to help fund research and development costs of conservation engineering without biological effects on stocks. In addition, there are benefits to evaluating gear modifications under the most realistic fishing scale and conditions. Research charters can be a difficult and potentially very expensive and possibly less effective way to recreate actual fishing conditions compared to an EFP test. The EFP also allows for the collection of data in context of the experimental design that would not be otherwise allowed under the groundfish regulations. For these reasons, an EFP is considered the best method for developing a salmon excluder device.

1.2.6 Evolution Of The Concept Of A Salmon Excluder Device For The Pollock Fishery

Design of BRDs necessitates information on fish behavior in response to different stimuli such as the change in water pressure and direction associated with a bycatch reduction device. Development of a salmon BRD for pollock nets would require observation of how salmon behave in a pelagic pollock net relative to pollock, and lacking this, development of concepts for excluders would likely not be productive. Observation of differences in location, swimming ability, or response to stimuli have been critical to the development of effective BRDs (Glass and Wardle 1995).

Given the information obtained from some preliminary video footage of chum salmon behavior in a pelagic pollock trawl, behavioral difference between the target species and salmon may allow for the development of an effective BRD[1]. The first step in the development of prototype salmon BRDs has been to tap into the fishing industry's ideas on how such an excluder might function. A meeting that attempted to accomplish this goal was held by the United Catcher Boat Association (UCBA) in the spring of 2002. The product of the meeting was strong support for the development of an excluder device, however, none of the participants had any existing designs for such an excluder.

Following that meeting, Dr. Craig Rose of the Alaska Fisheries Science Center (AFSC) carried out a research charter on a pollock vessel in the summer of 2002 to deploy low light camera equipment and a new technology called "acoustic video" to obtain images of how salmon and pollock behave in the portion of a trawl net called the tapered intermediate. Dr. Rose was also able to perform some basic net modifications (cutting an escapement portal) to get some idea of how salmon react to such an escapement opportunity. This preliminary work suggests that, as would be expected, salmon are stronger swimmers compared to pollock. In addition, it appears that salmon may prefer to swim in the upper (furthest from the seafloor) portion of the trawl intermediate.

Dr. Rose's video and digital footage from his charter last summer are currently under review by trawl skippers and gear manufacturers. While still preliminary, some concrete ideas for excluder designs have emerged[2]. A depiction of a potential prototype devices is seen in Figure 1.3. The device depicted in the drawing is based upon a funnel of smaller mesh webbing placed within the mid-section portion of the trawl. The funnel would attempt to create an eddy in the water flow at the aft section of the device where escapement portals would be used to provide salmon an egress opportunity (here shown with a recapture device attached).

---

[1]Dr. Craig Rose, Alaska Fisheries Science Center, personal communication, March 2003.

[2]John Gruver, Catcher Vessel Inter-cooperative Manager, personal communication, March 2003, United Catcher Boats Association, 4005 20th Ave. W. Ste. 116, Fisherman's Terminal, Seattle, WA 98199.

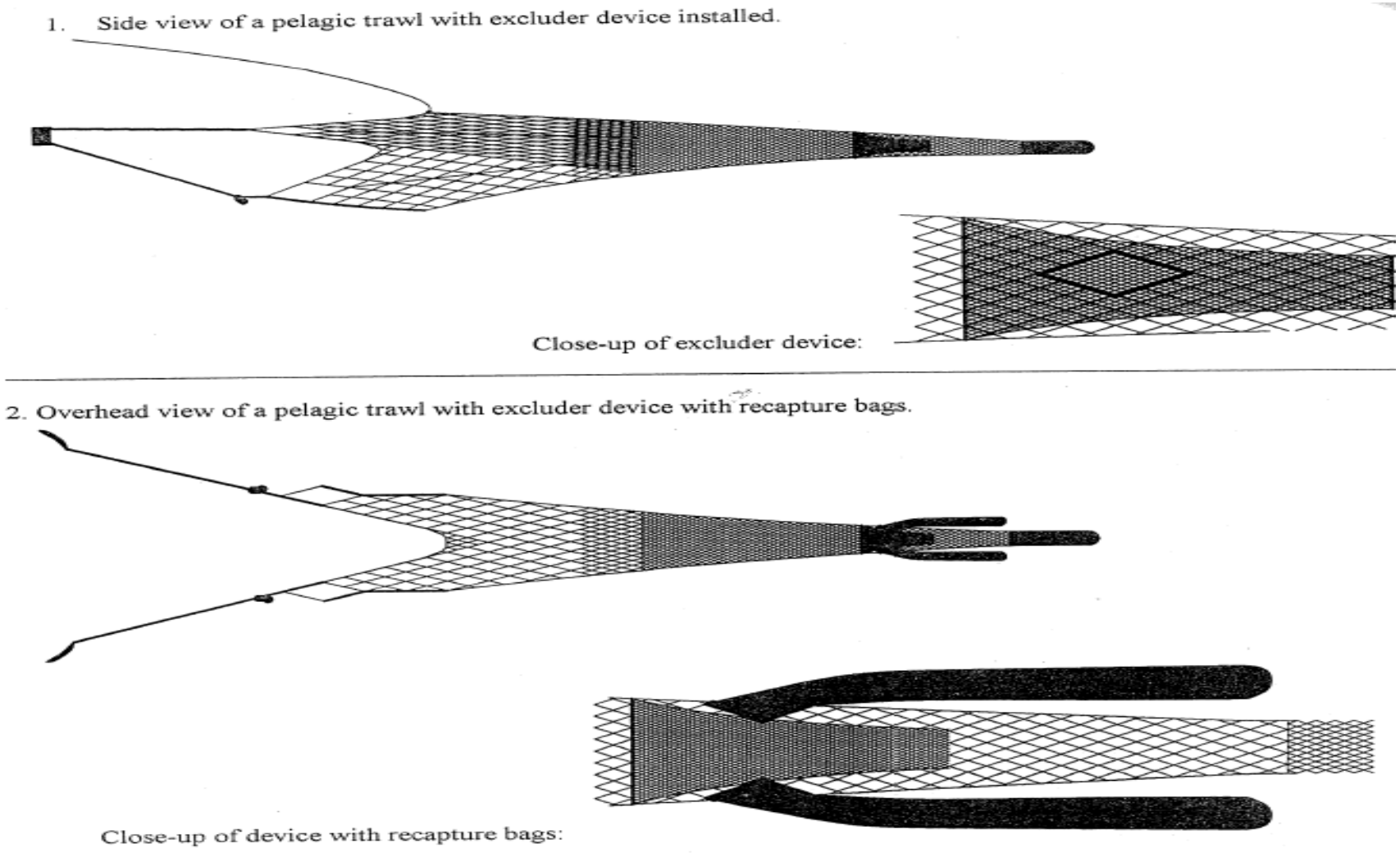


Figure 1.3 Salmon Excluder Device with Recapture Device Attached

An iterative development process with research charters leading into a formal EFP test has been followed previously in 2000-2001 for the successful development of a halibut excluder for Pacific cod trawls (Rose 2001). In that earlier process, industry had some conceptual expectations for what a halibut excluder for Pacific cod trawls would require in order to allow halibut to escape without compromising Pacific cod catch rates, but no one had a clear design idea at the outset. In the case of this proposed action, the video footage may provide a better starting point by providing information about the behavioral differences between target and bycatch species than was available for the Pacific cod trawl halibut excluder EFP project in 2000-2001. The behavioral differences in the trawl between chum and chinook salmon may also exist, requiring the testing of the devices on both species. If the behavior is different, a device specific to each species may need to be developed.

1.3 Related NEPA Documents

The Affected Environment and Environmental Impacts of the Alternatives sections of this environmental assessment (EA) adopt much of the information in the following environmental analyses.

Steller sea lion protection measures Supplemental Environmental Impact Statement. November 2001. DOC, NOAA National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

Draft Programmatic Supplemental Environmental Impact Statement (PSEIS) For Alaska Groundfish Fisheries Implemented Under the Authority of The Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area. January 2001. National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802 or through the NMFS web site at http://www.fakr.noaa.gov. This document is currently being revised based on public comment and a revised draft is scheduled for release in the fall of 2003

Environmental Assessment for the Total Allowable Catch Specifications for the Year 2003 Alaska Groundfish Fisheries. January 2003. DOC, NOAA, National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

1.4 Public Participation

The application for the exempted fisheries permit was noticed in the Federal Register on April 15, 2003, (68 FR 18187). No comments regarding the application were received. The application was also in the agenda for the Council's April 2003 meeting (68 FR 12894 March 18, 2003). The applicant presented the project to the Council at its April 2003 meeting, and the Council approved the project.

2.0 ALTERNATIVES CONSIDERED

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) require a range of alternatives to be analyzed for a federal action. The alternatives analyzed may be limited to a range of alternatives that could reasonably achieve the need that the proposed action is intended to address. Section 1.0 of this document described the purpose and need of the proposed action.

The purpose of this action is to allow the testing of salmon excluder devices on pollock trawl gear in the Eastern Bering Sea. The applicant has worked closely with the AFSC in the development of the experimental design, and this design has been approved by the AFSC (DeMaster 2003). The experimental design requires the applicant's exemption from several groundfish regulations including:

§ 679.7(a)(2): Persons are prohibited from conducting any fishing contrary to notification of inseason actions, closures or adjustments under §§ 679.20, 679.21, 679.22, and 679.25. Groundfish taken under the EFP will not be applied to the total allowable catch (TAC) limit specified in the annual harvest specifications (§ 679.20(a)). The EFP would allow for the harvest of up to 2,270 mt of groundfish. The EFP will allow for the harvest of salmon in the salmon savings areas, even though they may be closed, and the salmon harvested will not count towards that annual PSC limits (see below). As the Council and NMFS have approved for past EFP experiments dedicated to bycatch reduction, groundfish and prohibited species taken during the experiment should not be counted against the annual total allowable catch and prohibited species bycatch caps (65 FR 55223, September 13, 2000).

§679.21(e)(1)(vii) and (viii): Salmon taken during the experiment will not be counted against the bycatch limits established for chinook and non-chinook salmon. The EFP would allow for the take of up to 2,183 non-chinook salmon and 217 chinook salmon, the maximum amount of salmon that may be taken, estimated by the applicants. Taking of the salmon during the experiment is crucial for determining the effectiveness of the device. The potential exists that the amount of pollock trawl salmon bycatch taken by the industry during the EFP period will approach or exceed the salmon bycatch limits. The additional salmon taken during the experiment would create an additional burden on the pollock trawl industry, if the EFP salmon is counted toward the salmon bycatch limits and triggers closure of the salmon savings areas.

§ 679.21(e)(7)(vii) and (viii) and § 679.22(a)(10): The applicants have also requested an exemption from closures of the Chinook Salmon Savings Area and the Chum Salmon Savings Area. The experiment must be conducted in areas of salmon concentration to ensure a sufficient sample size. The salmon savings areas are areas of known concentration of salmon and provide an ideal location for conducting the experiment and ensuring the vessel encounters concentrations of salmon.

§ 679.22(a)(7)(vii): The closure of the Steller Sea Lion Conservation Area (SCA) is based on sector specific limits of no more than 28 percent of the annual TAC taken before April 1. This

section also requires the closure of the SCA to vessel greater than 99 feet length overall (LOA) to provide for harvesting by vessels in the inshore sector under 99 feet LOA. Large portions of the Chinook Salmon Savings Area and the Chum Salmon Savings Area occur in the SCA. In order to conduct the experiment where salmon are likely to occur, the EFP will include an exemption from closure of the SCA, as long as the total amount of pollock harvest by all sectors remains below the 28 percent annual TAC amount.

The applicant also requested exemption from any future Steller sea lion protection areas to ensure enough locations are available for pollock and salmon harvest during the experiment. NMFS is unable to consider an exemption from future requirements without a full analysis of the potential impacts. This analysis is not possible without the specifics of potential changes to the Steller sea lion protection measures. Modifications to the Steller sea lion protection measures are undefined at this time. An exemption from future Steller sea lion protection areas is not considered with this action.

To accomplish the purpose of this proposed action, within the boundaries of the groundfish regulations (50 CFR part 600 and 679) and ensuring the use of the carefully developed experimental design, an exempted fishing permit under 50 CFR 679.6 must be issued. Therefore, the alternatives for this action are limited to:

Alternative 1 (Status Quo): No EFP is issued. The experiment for the salmon excluder devices would not be permitted due to potential violation of regulations, as detailed above.

Alternative 2: An EFP is issued (Preferred Alternative). The testing of the salmon excluder devices would be permitted with exemptions from §§ 679.7(a)(2) (regarding 679.20(a); 679.21(e)(1)(vii) and (viii), and (e)(7)(vii) and (viii); and 679.22(a)(10)); 679.21(e)(1)(vii) and (viii); and (e)(7)(vii) and (viii); and 679.22(a) (7)(vii) and (a)(10). The EFP would allow the applicant to conduct the experiment as designed in cooperation with the Alaska Fisheries Science Center. Details of the experiment are contained in Appendix A.

The experiment will be conducted for approximately 15 days during two time periods, in the fall 2003 for the chum salmon test and in the spring of 2004 for the chinook salmon test. A catcher vessel greater than 99 ft LOA used in the BSAI trawl fishery that delivers to a shoreside processor or mothership will be chartered for the work. The trawl net will be modified to add the salmon excluder device and a recapture device to provide for data collection.

Analysis will primarily focus on the estimation of the proportions of pollock and salmon excluded from the catch through the device. The experiment is designed to estimate these values for the combination of all tows, representing the value of the device in ordinary fishery conditions. Variability of escape rates between tows will be examined for indications of conditions affecting excluder performance. Combined size composition data will be tested for differences between retained and escaping fish. Groundfish harvested by the charter vessel will be retained for sale to the extent allowed under § 679.20(e) and (f) with pollock designated as the target species. If the salmon is of acceptable quality, it will be donated under the Prohibited

Species Donation Program (PSDP) (§ 679.26), otherwise it will be discarded as required by § 679.21(b). Results will be presented by the applicant in preliminary and final reports made available to managers, trawlers, scientist, and the public.

3.0 AFFECTED ENVIRONMENT

Information provided by the applicant for the EFP indicates that harvesting of target groundfish species and prohibited species (salmon) during the experiment would occur. Potential effects on the environment can occur with the removal of target and prohibited species during groundfish harvesting. Pollock and salmon are also prey species of marine mammals, including Steller sea lions, warranting further analysis of potential effects on marine mammals. Even though this action alone has no impact socioeconomically on the pollock industry, there is the potential that the successful development of a salmon excluder device may affect the efficiency of the pollock fisheries to avoid bycatch and prosecute a fishery with less restrictions. Because of the limited amounts of harvest, manner of testing, and the short duration of the testing, other components of the environment are not likely to be impacted and further analysis is not needed. The impacts will be examined in Section 4.0.

Table 3.1 shows the components of the human environment and whether Alternative 2 may have an impact on the component beyond status quo, or Alternative 1, and require further analysis. Extensive environmental analysis on all environmental components is not needed in this document because the alternatives are not anticipated to have environmental impacts on all components. Analysis is included for those environmental components on which Alternative 2 may have an impact beyond impacts analyzed for Alternative 1 in previous NEPA analysis (NMFS 2001a and 2003).

Table 3.1 Resources potentially affected by Alternative 2 beyond Status Quo

Potentially Affected Component							
Physical	Benthic Comm.	Groundfish	Marine Mammals	Seabirds	Other Species	Prohibited Species	Socioeconomic
N	N	Y	Y	N	N	Y	Y

N = no impact anticipated by the alternative on the component.
Y = an impact is possible if the alternative is implemented.

The draft PSEIS (NMFS 2001a) provides a complete detailed description of the environment that may be affected by groundfish fishing activities in the following sections:
Features of the physical environment, section 3.1.
Fishing gear effects on substrate and benthic communities, section 3.2.
Groundfish resources, section 3.3,
Marine mammals, section 3.4.
Seabirds, section 3.5
Other species, section 3.6.

Prohibited species, section 3.7
Contaminants, section 3.8.
Interactions between climate, commercial fishing and the ecosystem, section 3.9.
Socioeconomic environment, section 3.10.

This EA adopts much of the environmental status description in the draft PSEIS because it provides a recent, detailed description. Additionally, the current, detailed status of each target species category, biomass estimates, and ABC specifications for the BSAI are presented annually both in summary and in detail in the annual BSAI SAFE report (NPFMC 2002). The SAFE reports for the 2003 groundfish fisheries are available through the Council's home page at http://www.fakr.noaa.gov/npfmc. The EA for the Total Allowable Catch Specification for the Alaska Groundfish Fishery (2003 groundfish fishery EA) also provides a recent description of the groundfish fisheries and potential impacts (NMFS 2003).

3.1 Status of Managed Groundfish Species

Designated target groundfish species and species groups in the BSAI are walleye pollock, Pacific cod, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, other flatfish, flathead sole, sablefish, Pacific ocean perch, other rockfish, Atka mackerel, squid, and other species. This EA cross-references and summarizes the status of the stock information in the SAFE reports (NPFMC 2002). For detailed life history, ecology, and fishery management information regarding groundfish stocks in the BSAI see Section 3.3. in the draft PSEIS (NMFS 2001a) and the 2003 groundfish fishery EA (NMFS 2003).

For those stocks where enough information is available, none are considered overfished or approaching an overfished condition. The BSAI Plan Team met in November 2002 to finalize the SAFE report and to forward ABC and OFL recommendations to the Council for action at its December 2002 meeting. The ABC, OFL, and TAC amounts for each target species or species group for 2003 were specified (68 FR 9907, March 3, 2003). Table 3.2 shows the 2003 ABC, OFL and TAC amounts for the BSAI groundfish fisheries.

Table 3.2. 2003 Overfishing Level (OFL), Acceptable Biological Catch (ABC), and Total Allowable Catch (TAC) in the BSAI [Amounts are in mt]

Species	Area	OFL	ABC	TAC
Pollock	Bering Sea (BS)	3,530,000	2,330,000	1,491,760
	Aleutian Islands (AI)	52,600	39,400	1,000
	Bogoslof District	45,300	4,070	50
Pacific cod	BSAI	324,000	223,000	207,500
Sablefish	BS	4,290	2,900	2,900
	AI	4,590	3,100	3,100
Atka mackerel	Total	99,700	63,000	60,000
	Western AI	.....	22,990	19,990
	Central AI	.....	29,360	29,360
	Eastern AI/BS	.....	10,650	10,650

Yellowfin sole	BSAI	136,000	114,000	83,750
Rock sole	BSAI	132,000	110,000	44,000
Greenland turbot	Total	17,800	5,880	4,000
	BS	.....	3,920	2,680
	AI	.....	1,960	1,320
Arrowtooth flounder	BSAI	139,000	112,000	12,000
Flathead sole	BSAI	81,000	66,000	20,000
Other flatfish	BSAI	21,400	16,000	3,000
Alaska plaice	BSAI	165,000	137,000	10,000
Pacific ocean perch	BSAI	18,000	.....	.....
	BS		2,410	1,410
	AI Total	.....	12,690	12,690
	Western AI	.....	5,850	5,850
	Central AI	.....	3,340	3,340
	Eastern AI	.....	3,500	3,500
Northern rockfish	BSAI	9,468	7,101	
	BS			121
	AI			5,879
Shortraker/rougheye	BSAI	1,289	967	.....
	BS	.....	.....	137
	AI	.....	.....	830
Other rockfish	BS	1,280	960	960
	AI	846	634	634
Squid	BSAI	2,620	1,970	1,970
Other species	BSAI	81,100	43,300	32,309
TOTAL		4,867,308	3,296,382	2,000,000

3.2 Status of Prohibited Species Stocks

Prohibited species taken incidentally in groundfish fisheries include: Pacific salmon (chinook, coho, sockeye, chum, and pink salmon), steelhead trout, Pacific halibut, Pacific herring, and Alaska king, Tanner, and snow crabs. In order to control bycatch of prohibited species in the BSAI groundfish fisheries, the Council annually specifies halibut and other PSC limits. The status of the prohibited species in the BSAI is detailed in section 3.7 of the draft PSEIS (NMFS 2001a) and in the SAFE report (NPFMC 2002). During haul sorting, these species or species groups are to be returned to the sea with a minimum of injury except when their retention is required by other applicable law.

With the proposed action, salmon and herring are the only PSC species that are expected to be taken, so additional status information regarding salmon and herring is provided in this section. Salmon and herring are the most common PSC species taken in the midwater trawl pollock fishery (NMFS 2002).

3.2.1 Salmon

Table 3.3 shows the bycatch of salmon in the BSAI trawl fisheries in 2002.

Table 3.3 **Incidental Take of Salmon in BSAI Trawl Fisheries** (values are in numbers of fish), Year 2002 data are from January 20, 2002 through December 31, 2002.

BSAI Trawl Fishery Group	Year 2002		
	Chinook	Other Salmon	Total
Midwater Pollock	32,239	77,027	109,266
Pacific Cod	3,250	984	4,234
Yellowfin Sole	321	461	783
Rock Sole/Other Flatfish	675	152	827
Other	931	89	1,020
Total	37,417	78,714	116,130

Chinook salmon incidental catch through December 31, 2002, in the BSAI was 37,417 fish, of which 32,239 were taken in the pollock trawl fishery. Incidental catch of chinook salmon in the BSAI is under the annual limit for 2002 for the pollock trawl fishery of 37,000 fish. For the first time since 1994, the Chum Salmon Savings Area was closed in 2002 from September 21 through October 14. Approximately 48,000 non-chinook salmon were taken in the CVOA in 2002[3].

In 2003, the bycatch of chinook salmon in the AFA pollock fishery is 30,192 fish by March 29, 2003. The portion of the annual limit of 33,000 chinook salmon for 2003 allocated to the AFA pollock fishery is 30,525 fish. The AFA pollock fishery is approaching its 2003 chinook salmon PSC limit, and it is possible that the Chinook Salmon Savings Area will need to be closed for a portion of 2003. The bycatch of non-chinook salmon by March 29, 2003 was 2,534 fish. (NMFS inseason data at http://www.fakr.noaa.gov/2003/car120_bsai.pdf)

3.2.2 Pacific Herring

Pacific herring bycatch rates in the midwater pollock trawl fishery have decrease since the early 1990's. The Pacific herring PSC limit in 2002 was 1, 525 mt. A total of 131 mt of Pacific herring was taken in the BSAI trawl fisheries in 2002. Herring bycatch by pollock catcher vessels was 90 mt, approximately 6 percent of the annual limit. Fifty-five percent of the bycatch was taken from the September 1 through October 31 time period. Five percent of the herring bycatch taken by catcher vessels in 2002 was taken in the time period between January 20 and March 16.[4]

---

[3]Andrew Smoker, Inseason Manager, personal communication, April 4, 2003, NMFS Alaska Region, Sustainable Fisheries Division, P.O. Box 21668, Juneau, AK 99802.

[4]Mary Furuness, Inseason Specialist, personal communication, April 10, 2003, NMFS Alaska Region, Sustainable Fisheries Division, P. O. Box 21668, Juneau, AK 99802.

3.3 Forage Species and Nonspecified Species

Forage fish species are abundant fishes that are preyed upon by marine mammals, seabirds and other commercially important groundfish species. The following forage species are included in the forage fish category established in 1998: Osmeridae (which includes capelin and eulachon), Myctophidae (lanternfishes), Bathylagidae (deep sea smelts), Ammodytidae (sand lances), Trichodontidae (sandfishes), Pholididae (gunnels), Stichaeidae (pricklebacks), Gonostomatidae (bristlemouths), and the Order Euphausiacea (krill). For further detailed discussion of forage fish species, see section 3.3.1.13 of the draft PSEIS (NMFS 2001a). Nonspecified species are fish and invertebrate species that are not managed under the FMPs, such as jellyfish and sea stars. Detailed information on nonspecified species may be found in section 3.6 of the draft PSEIS (NMFS 2001a).

3.4 Status of Marine Habitat

The adjacent marine waters outside the exclusive economic zone, adjacent State of Alaska waters, shoreline, freshwater inflows, and atmosphere above the waters, constitutes habitat for prey species, other life stages, and species that move in and out of, or interact with, the target species in the management areas (NMFS 2001a). Distinctive aspects of the habitat include water depth, substrate composition, substrate infauna, light penetration, water chemistry (salinity, temperature, nutrients, sediment load, color, etc.), currents, tidal action, phytoplankton and zooplankton production, associated species, natural disturbance regimes, and the seasonal variability of each aspect. Substrate types include bedrock, cobbles, sand, shale, mud, silt, and various combinations of organic material and invertebrates which may be termed biological substrate. Biological substrates present in these management areas include corals, tunicates, mussel beds, tube worms. Biological substrate has the aspect of ecological state (from pioneer to climax) in addition to the organic and inorganic components. Ecological state is heavily dependant on natural and anthropogenic disturbance regimes.

The FMPs (NPFMC 1999a, 1999b) contain descriptions of habitat requirements and life histories of the managed species. All the marine waters and benthic substrates in the management areas comprise the habitat of the target species. Much remains to be learned about habitat requirements for most of the target species. A detailed discussion of habitat and potential effects of fishing on habitat is in section 3.2 of the draft PSEIS (NMFS 2001a).

3.5 Status of Marine Mammal Populations

Marine mammals not listed under the Endangered Species Act (ESA) that may be present in the Gulf of Alaska (GOA) and BSAI include cetaceans, [minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), Dall's porpoise *(Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), and the beaked whales (e.g., *Berardius bairdii* and *Mesoplodon spp*.)] as well as pinnipeds [northern fur seals (*Callorhinus ursinus*), and Pacific harbor seals (*Phoca vitulina*)] and the sea otter (*Enhydra*

lutris). The sea otter has been identified as a candidate for listing under the ESA, and the US Fish and Wildlife Service (USFWS) is conducting a formal review. For further information on marine mammal population status, see Section 3.4 of the draft PSEIS (NMFS 2001a).

3.6 Seabird Species Population Status and Raptor Interactions with Groundfish Fisheries

Seabirds by definition spend the majority of their life at sea rather than on land. Alaska's extensive estuaries and offshore waters provide breeding, feeding, and migrating habitat for approximately 100 million seabirds. Thirty-four species breed in the BSAI and GOA regions numbering 36 million and 12 million individuals in each respective area. Another 6 species breed at other locations in Alaska. In addition, up to 50 million shearwaters and 3 albatross species feed in Alaskan waters during the summer months but breed farther south. The current world population of short-tailed albatross is approximately 1200 individuals. Detailed seabird information on species population status, life history, ecology, and bycatch is contained in section 3.5 of the draft PSEIS (NMFS 2001a) and section 3.7 of the Steller sea lion SEIS (NMFS 2001b).

The Bald Eagle Protection Act (16 U.S.C. 668(a)) and the Migratory Bird Treaty Act (16 U. S. C. 703-712) prohibit the taking of bald eagles. Taking includes causing the injury or death of an eagle. In February 2001, the USFWS surveyed the pollock shoreside fish processing facilities in Unalaska regarding interactions with Bald Eagles.[5] Anecdotal information indicated that eagles were attracted to the pollock vessels delivering shoreside, with birds entering the ship holds, and becoming caught in the hoppers as fish is being delivered. It was determined that the covering of fish totes on deck, cleaning the decks of fish parts and dragging the trawl nets through the water to remove fish parts were key to reducing the food source attraction for the eagles. It is not known what percentage of the fishing industry use these practices. Occasionally an injured bird would be sent to the Bird Treatment and Learning Center (BTLC) in Anchorage, Alaska for rehabilitation. The BTLC maintains a database recording information about the nature and cause of each birds injury, but many birds received from Unalaska are not accompanied by information on the cause of the injury. The current database contains no birds reported as injured by groundfish fishing activities.[6] The BTLC staff also reported that they received an owl that had head injuries from flying into lights on a fishing vessel and have had an eagle injured by being stuck in a crab pot. It is believed that the incident of raptor injury or death from interactions with the groundfish fisheries is rare, (one or two per year).

3.7 Status of Endangered or Threatened Species

[5]Michael Jacobson, Wildlife Biologist, Personal Communication, April 22, 2003, USFWS 3000 Vintage Blvd. Ste. 201, Juneau, AK 99801.

[6]Ferg Fergeson, Volunteer, Personal Communication, April 22, 2003, The Bird Treatment and Learning Center, 6132 Nielson Way, Anchorage, AK.

The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*; ESA), provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by the NMFS for most marine mammal species, marine and anadromous fish species, and marine plants species, and by the USFWS for bird species, and terrestrial and freshwater wildlife and plant species.

The designation of an ESA listed species is based on the biological health of that species. The status determination is either threatened or endangered. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. § 1532(20)]. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. § 1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine fish, plants, and mammals (except for walrus and sea otter) and anadromous fish species. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species.

In addition to listing species under the ESA, the critical habitat of a newly listed species is designated concurrent with its listing to the "maximum extent prudent and determinable" [16 U.S.C. § 1533(b)(1)(A)]. The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. Federal agencies are prohibited from undertaking actions that destroy or adversely modify designated critical habitat. Some species, primarily the cetaceans, which were listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Federal agencies have an affirmative mandate to conserve listed species. One assurance of this is Federal actions, activities or authorizations (hereafter referred to as Federal action) must be in compliance with the provisions of the ESA. Section 7 of the ESA provides a mechanism for consultation by the Federal action agency with the appropriate expert agency (NMFS or USFWS). Informal consultations, resulting in letters of concurrence, are conducted for Federal actions that may affect, but are not expected to adversely affect, listed species or critical habitat. Formal consultations, resulting in biological opinions, are conducted for Federal actions that may have an adverse affect on the listed species. Through the biological opinion, a determination is made as to whether the proposed action is likely to jeopardize the continued existence of a listed species (jeopardy) or destroy or adversely modify critical habitat (adverse modification). If the determination is that the action proposed (or ongoing) will cause jeopardy, reasonable and prudent alternatives may be suggested which, if implemented, would modify the action to avoid the likelihood of jeopardy to the species or destruction or adverse modification of designated critical habitat. A biological opinion with the conclusion of no jeopardy may contain conservation recommendations intended to further reduce the negative impacts to the listed species. These conservation recommendations are advisory to the action agency

[50 CFR. 402.25(j)]. If a likelihood exists of any taking[7] occurring during promulgation of the action, an incidental take statement may be appended to a biological opinion to provide for the amount of take that is expected to occur from normal promulgation of the action.

Twenty-three species occurring in the GOA and/or BSAI groundfish management areas are currently listed as endangered or threatened under the ESA (Table 3.4). The group includes great whales, pinnipeds, Pacific salmon and steelhead, and seabirds.

[7] The term "take" under the ESA means "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct" [16 U.S.C. § 1538(a)(1)(B)].

Table 3.4 ESA listed and candidate species that range into the BSAI or GOA groundfish management areas and whether Reinitiation of Section 7 Consultation is occurring

.

Common Name	Scientific Name	ESA Status	Whether Reinitiation of ESA Consultation is occurring
Blue Whale	*Balaenoptera musculus*	Endangered	No
Bowhead Whale	*Balaena mysticetus*	Endangered	No
Fin Whale	*Balaenoptera physalus*	Endangered	No
Humpback Whale	*Megaptera novaeangliae*	Endangered	No
Right Whale	*Balaena glacialis*	Endangered	No
Sei Whale	*Balaenoptera borealis*	Endangered	No
Sperm Whale	*Physeter macrocephalus*	Endangered	No
Steller Sea Lion (Western population)	*Eumetopias jubatus*	Endangered	No
Steller Sea Lion (Eastern Population)	*Eumetopias jubatus*	Threatened	No
Chinook Salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Lower Columbia R.)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Upper Columbia R. Spring)	*Oncorhynchus tshawytscha*	Endangered	No
Chinook Salmon (Upper Willamette .)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Snake River Spring/Summer)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Snake River Fall)	*Oncorhynchus tshawytscha*	Threatened	No
Sockeye Salmon (Snake River)	*Oncorhynchus nerka*	Endangered	No
Steelhead (Upper Columbia River)	*Onchorynchus mykiss*	Endangered	No
Steelhead (Middle Columbia River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Lower Columbia River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Upper Willamette River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Snake River Basin)	*Onchorynchus mykiss*	Threatened	No
Steller's Eider [1]	*Polysticta stelleri*	Threatened	Ongoing
Short-tailed Albatross [1]	*Phoebaotria albatrus*	Endangered	Ongoing
Spectacled Eider[1]	*Somateria fishcheri*	Threatened	Ongoing
Northern Sea Otter[1]	*Enhydra lutris*	Candidate	No

[1]The Steller's eider, short-tailed albatross, spectacled eider, and Northern sea otter are species under the jurisdiction of the U.S. Fish and Wildlife Service. For the bird species, critical habitat has been established for the Steller's eider (66 FR 8850, February 2, 2001) and for the spectacled eider (66 FR 9146, February 6, 2001). The northern sea otter has been proposed by USFWS as a candidate species (November 9, 2000; 65 FR 67343).

Section 7 consultations with respect to actions of the federal groundfish fisheries have been done for all the species listed in Table 3.1, either individually or in groups. An FMP level biological opinion was prepared pursuant to Section 7 of the ESA on all NMFS listed species present in the fishery management areas for the entire groundfish fisheries program. This comprehensive biological opinion (FMP BiOp) was issued November 30, 2000 (NMFS 2000). The Steller sea lion was the only species to be determined to be in jeopardy or risk of adverse modification of its habitat based upon the FMPs. NMFS has implemented protection measures for the groundfish fisheries that avoid the likelihood of posing jeopardy or adverse modification of critical habitat for the western distinct population segment of Steller sea lions (NMFS 2001b, appendix A and 68 FR 204, January 2, 2003). Consultations prepared subsequent to 1998 are summarized below.

Steller sea lions and other ESA listed marine mammals.

In compliance with the ESA, NMFS developed a reasonable and prudent alternative (RPA) for the BSAI and GOA groundfish fisheries to avoid jeopardy to endangered Steller sea lions and adverse modification of their critical habitat. The RPA is based on the following three main principles: (1) temporal dispersion of fishing effort, (2) spatial dispersion of fishing effort, and (3) sufficient protection from fisheries competition for prey in waters adjacent to rookeries and important haulouts. The RPA focused on three fisheries that posed the most concern for competition with Steller sea lions for prey; the BSAI and GOA pollock and Pacific cod fisheries, and the BSAI Atka mackerel fishery. Neither the conclusions of the FMP BiOp (NMFS 2000) nor the RPA was adopted by the Council at its December 2000 meeting for numerous reasons, including lack of confidence in the scientific premises supporting the biological opinion, lack of public and Council input during its development, and general disagreement about the efficacy of the RPA measures. Subsequently, the Alaska congressional delegation sponsored a rider to the 2001 appropriations bill (Section 209 of Pub. L. 106-554) that provided direction for a one-year phase-in of the RPA and opportunity for the Council to assess and potentially modify the RPA prior to full implementation in 2002 based on independent scientific reviews or other new information.

The protection measures in the emergency rule (66 FR 7276, January 22, 2001) reflect the first year implementation phase of the RPA. In January 2001, the Council established an RPA Committee to make recommendations on Steller sea lion protection measures for the second half of 2001 and to develop Steller sea lion protection measures for 2002 and beyond. The RPA Committee was composed of 21 members from the fishing community, the environmental community, NMFS, the Council's Science and Statistical Committee, the Council's Advisory Panel, and ADF&G. In April 2001, the RPA Committee presented its recommendations to the Council for fishery management measures for the second half of 2001. These recommendations were then forwarded by the Council to NMFS and were implemented by amendment to an emergency interim rule (66 FR 37167, July 17, 2001). In June 2001, the RPA Committee recommended Steller sea lion protection measures for 2002 and beyond, and the Council modified and forwarded these recommendations to NMFS in October 2001. ESA consultation was requested on these protection measures and a biological opinion (2001 BiOp) was prepared by the Protected Resources Division (NMFS 2001b, Appendix A). The final 2001 BiOp

concluded that the proposed Steller sea lion protection measures were not likely to jeopardize the continued existence of either the eastern or western distinct population segment of Steller sea lions or adversely modify their critical habitat. These protection measures are implemented by final rule in 2003 (68 FR 204, January 2, 2003). Detailed analysis of the Steller sea lion protection measures is contained in the SEIS for Steller sea lion protection measures (NMFS 2001b).

On December 18, 2002, the United States District Court for the Western District of Washington remanded to NMFS the 2001 BiOp for the groundfish fisheries managed pursuant to the Steller sea lion protection measures published on January 2, 2003 (68 FR 204). Greenpeace, et al. v. National Marine Fisheries Service, No.C98–492Z (W.D. Wash.). The Court held that the biological opinion's findings of no jeopardy to the continued existence of endangered Steller sea lions and no adverse modification of their critical habitat were arbitrary and capricious. On December 30, 2002, the Court issued an Order declaring that the 2001 BiOp "shall remain effective until June 30, 2003," while NMFS completes the response to the remand. The response will evaluate the effects of fishing activities authorized pursuant to the Steller sea lion protection measures final rule on listed species and critical habitat.

ESA Listed Pacific Salmon and Steelhead

Using the year 2000 proposed TAC specifications, NMFS reinitiated consultations for ESA listed Pacific salmon for twelve ESUs of Pacific salmon and steelhead that are thought to range into Alaskan waters. The consultation for the Pacific salmon and steelhead species was issued December 22, 1999, and contained a determination of not likely to jeopardize their continued existence. No critical habitat has been designated for these species within the action area, therefore, none will be affected by the groundfish fisheries. The biological opinion reviewed the status of Snake river fall chinook, Snake River spring/summer chinook, Puget Sound chinook, Upper Columbia river spring chinook, Upper Willamette River chinook, Lower Columbia river chinook, Upper Columbia river steelhead, Upper Willamette River steelhead, Middle Columbia river steelhead, Lower Columbia river steelhead, and Snake river Basin steelhead, the environmental baseline for the action area, the effects of the proposed fishery and the cumulative effects. The opinion was accompanied by an Incidental Take Statement (ITS) that states the catch of listed fish will be limited specifically by the measures proposed to limit the total bycatch of chinook salmon. Bycatch should be minimized to the extent possible and in any case should not exceed 55,000 chinook per year in the BSAI fisheries or 40,000 chinook salmon per year in the GOA fisheries. The FMP BiOp (NMFS 2000) stated that ESA listed Pacific salmon and steeelhead are not in jeopardy or risk of adverse modification of their habitat by the groundfish fisheries in the BSAI or GOA, and reaffirmed the ITS in the previous opinion.

NMFS has conducted a code wire tag study on surrogate stocks of ESA listed salmon for the Upper Willamette and Lower Columbia rivers nearly annually since 1984. For all the years data have been collected, no more than 3 tagged fish in a year was estimated taken in the BSAI

groundfish fisheries[8].

ESA Listed Seabirds

The only new information on seabirds since 1998 concerns the taking of short-tailed albatross and subsequent Section 7 consultations on listed seabird species. It is summarized below:

On 22 October 1998, NMFS reported the incidental take of 2 endangered short-tailed albatrosses in the hook-and-line groundfish fishery of the BSAI. The first bird was taken on 21 September 1998, at 57 30'N, 173 57'W. The bird had identifying leg bands from its natal breeding colony in Japan. It was 8 years old. In a separate incident, one short-tailed albatross was observed taken on September 28, 1998, at 58 27'N, 175 16'W. A second albatross was also taken on 28 September 1998, but the species could not be confirmed (3 species of albatross occur in the North Pacific). Both vessels were using seabird avoidance measures when the birds were hooked.

The USFWS listed the short-tailed albatross as an endangered species under the ESA throughout its United States range (65 FR 46644, July 31, 2000). Under terms of the 1999 biological opinion ITS, a take of up to 4 birds is allowed during the 2-year period of 1999 and 2000 for the BSAI and GOA hook-and-line groundfish fisheries (USFWS 1999). NMFS Regional Office, NMFS Groundfish Observer Program, and the USFWS Offices of Ecological Services and Migratory Bird Management are actively coordinating efforts and communicating with each other in response to the 1998 take incidents and are complying to the fullest extent with ESA requirements to protect this species. Regulations at 50 CFR § § 679.24(e) and 679.42(b)(2) contain specifics regarding seabird avoidance measures. In February 1999, NMFS presented an analysis on seabird mitigation measures to the Council that investigated possible revisions to the currently required seabird avoidance methods that could be employed by the long-line fleet to further reduce the take of seabirds.

The Council took final action at its April 1999 meeting to revise the existing requirements for seabird avoidance measures. The Council's preferred alternative would: 1) explicitly specify that weights must be added to the groundline; 2) the offal discharge regulation would require that prior to any offal discharge, embedded hooks must be removed; 3) streamer lines, towed buoy bags and float devices could both qualify as bird scaring lines; 4) towed boards and sticks would no longer qualify as seabird avoidance measures; 5) the use of bird scaring lines would be required in conjunction to using a lining tube; and 6) night-setting would continue to be an option and would not require the concurrent use of a bird scaring line. These revised seabird avoidance measures were proposed February 7, 2003 (68 FR 6386) are expected to be in effect in 2003. The avoidance measures affect the method of harvest in the hook-and-line fisheries, but are not intended to affect the amount of harvest.

[8]Adrian Celewycz, NMFS, Auke Bay Lab, Personal Communication regarding CWT database, November 14, 2002.

A biological opinion on the BSAI hook-and-line groundfish fishery and the BSAI trawl groundfish fishery for the ESA listed short-tailed albatross was issued March 19, 1999, by the USFWS for the years 1999 through 2000 (USFWS 1999). The conclusion continued a no jeopardy determination and the ITS expressing the requirement to immediately reinitiate consultations if incidental takes exceed four short-tailed albatross over two years time. In September 2000, NMFS requested re-initiation of consultation for all listed species under the jurisdiction of the USFWS, including the short-tailed albatross, spectacled eider, and Steller's eider for the BSAI and GOA FMPs and 2001-2004 TAC specifications. Based on NMFS' review of the fishery action and the consultation material provided to USFWS, NMFS concluded that the BSAI and GOA groundfish fisheries are not likely to adversely affect either the spectacled eider or the Steller's eider or destroy or adversely modify the critical habitat that has been proposed for each of these species. Critical habitat has now been established for both the Steller's eider and the spectacled eider (66 FR 8850, February 2, 2001 and 66 FR 9146, February 6, 2001, respectively). The USFWS new biological opinion on the effects of the groundfish fisheries on listed seabirds is expected to be finalized in 2003.

3.8 Ecosystem Considerations

Ecosystem considerations for the BSAI and GOA groundfish fisheries are explained in detail in *Ecosystem Considerations for 2003* (NMFS 2003). The document provides updated information on biodiversity, essential fish habitats, consumptive and non-consumptive sustainable yields, and human considerations. This information is intended to be used in making ecosystem-based management decisions such as establishing ABC and TAC levels.

3.9 The Human Environment

The operation of the groundfish fishery in the BSAI and the GOA is described by gear type in the draft PSEIS (NMFS 2001a). General background on the fisheries with regard to each species is given in the BSAI and GOA groundfish FMPs (NPFMC 1999a and 1999b). The pollock trawl and State salmon fishery sectors are the only sectors that may be affected by this proposed action.

3.9.1 Fishery Participants

For detailed information on the fishery participants including vessels and processors in the pollock fishery see sections 3.3 of the Final Environmental Impact Statement for the American Fisheries Act Amendments 61/61/13/8 (NMFS 2002). Additional information regarding fishery participants can be found in the 2001 Economic SAFE report (Hiatt, Felthoven, and Terry, 2002).

3.9.2 Economic Aspects of the Fishery

The most recent description of the economic aspects of the groundfish fishery is contained in the 2001 Economic SAFE report (Hiatt, Felthoven, and Terry, 2002). This report, incorporated

herein by reference, presents the economic status of groundfish fisheries off Alaska in terms of economic activity and outputs using estimates of catch, bycatch, ex-vessel prices and value, the size and level of activity of the groundfish fleet, the weight and value of processed products, wholesale prices, exports, and cold storage holdings. The catch, fleet size, and activity data are for the fishing industry activities that are reflected in Weekly Production Reports, Observer Reports, fish tickets from processors who file Weekly Production Reports, and the annual survey of groundfish processors. External factors that, in part, determine the economic status of the fisheries are foreign exchange rates, the prices and price indices of products that compete with products from these fisheries, and fishery imports.

4.0 ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

The environmental impacts generally associated with fishery management actions are effects resulting from (1) harvest of fish stocks which may result in changes in food availability to predators and scavengers, changes in the population structure of target fish stocks, and changes in the marine ecosystem community structure; (2) changes in the physical and biological structure of the marine environment as a result of fishing practices, e.g., effects of gear use and fish processing discards; and (3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. A recent summary of the effects associated with groundfish harvest on the biological environment are discussed in the 2003 groundfish fishery EA (NMFS 2003). The draft PSEIS (NMFS 2001a) analyzes the impacts of fishing over a range of TAC specifications.

As described in Section 3, Table 3.1, the proposed action may impact only certain components of the environment: groundfish target species, prohibited species, marine mammals, and socioeconomic components. This section will focus on only these components of the environment.

4.1 Groundfish Target Species

The potential direct and indirect effects of the groundfish fisheries on target species are detailed in the draft PSEIS (NMFS 2001a). Direct effects include fishing mortality for each target species and spatial and temporal concentration of catch. Indirect effects include the changes in prey composition and changes in habitat suitability. Indirect effects are not likely to occur with either alternative because the proposed action does not change overall fishing practices that indirectly affect prey composition and habitat suitability. Temporal concentration of harvest is not likely because the experiment occurs during two seasons and over the time period of 15 days with one vessel. Spatial concentration is also not as likely because the harvest during the experiment occurs in various locations that are known for high chum and chinook salmon bycatch rates but are also common pollock trawling areas. These potential areas cover many square miles, Fig. 1.1 and 1.2, and harvest will be done by only one vessel. The only potential direct effect on target species is the harvest of groundfish during the testing of the salmon excluder devices.

The applicants for the EFP estimated that total harvest of allocated groundfish species including

both the chum salmon stage of the EFP work (970 MT of pollock in fall of 2003) and the chinook salmon stage (1,300 MT in spring of 2004) is 2,270 MT of groundfish. Approximately 98% (2,225 mt) is expected to be pollock and 2% (45.4 mt) is expected to be other groundfish species such as Pacific cod and flatfish. (UCBA 2003). The pollock TAC for the Eastern Bering Sea is 1,491,760 mt. The potential harvest under this proposed action of pollock is less than one percent of the TAC. The Pacific cod TAC is 207,500 mt and the other flatfish species TAC is 3,000 mt (Table 3.2). The harvest of other groundfish (Pacific cod and other flatfish) under the proposed action is likely to be less than one percent of the TACs for the other groundfish species.

Alternative 1. Status Quo

The Status Quo will not have adverse impacts on groundfish species beyond those analyzed in previous NEPA analyses (NMFS 2001a, section 4.4 and NMFS 2003). If the EFP is not issued, an effective salmon excluder device is less likely to be developed, and the pollock fisheries may continue to experience rates of salmon bycatch that could potentially result in the restriction of pollock fishing. Less pollock may be taken under this alternative when the Chum and/or Chinook Salmon Savings Areas are closed. Also the pollock, and other groundfish that are estimated to be taken during the testing of the salmon excluder device under Alternative 2 will not be harvested under the status quo, but this amount is less than one percent of the annual TAC for pollock.

Because the amount of pollock and other groundfish harvested under the proposed experiment (2,270 mt) and in the directed pollock fishery (TAC 1,491,760 mt) is well below the pollock ABC (2,330,000 mt), it is unlikely that not harvesting groundfish under the status quo compared to Alternative 2 would have any beneficial effect for the groundfish stocks.

Alternative 2. Issue the EFP

Issuing the EFP will allow for the removal of approximately 2,270 mt of groundfish (primarily pollock) from the BSAI above the TAC for the Eastern Bering Sea. As described above, this amount of harvest is less than one percent of the pollock TAC and ABC, and Pacific cod and flatfish TACs and ABCs in the Eastern Bering Sea. Because the amount of groundfish anticipated to be harvested during the experiment is very small and well below the ABCs, it is not likely that harvesting groundfish under Alternative 2 will have any effect on groundfish stocks.

The 2003 groundfish fishery EA establishes significance criteria for the harvest of groundfish (NMFS 2003, Table 4.1-1). To determine the significance of the amount of harvest of groundfish on target species stocks, the amount of harvest is compared to the Over Fishing Level (OFL). The TAC and ABC amount are set below the OFL for each target species. Harvests over time that average less than the OFL are considered not significant. For this proposed action the harvest of groundfish species is well under the OFL and is therefore, not significant.

4.2 Effects on Prohibited Species in Groundfish Fisheries Harvest

Catches of Pacific halibut, crabs, salmon, and herring are controlled by PSC limits for the BSAI that are established in regulations as part of the annual specification process. Section 4.3.5 of the draft PSEIS (NMFS 2001a) analyzes the impacts of fishing over a range of TAC specifications and compares them to impacts of status quo fishing on prohibited species. Potential direct and indirect effects include: the impact of incidental catch of prohibited species in the groundfish fisheries on stocks of prohibited species, the impact of incidental catch of prohibited species in the groundfish fisheries on the harvest levels of those species in their respective directed fisheries, and the effect on levels of incidental catch of prohibited species in the groundfish fisheries. An indirect effect of the groundfish fisheries is a potential change to the prey composition for PSC species. This action is not likely to affect PSC prey because any changes to the habitat or prey composition during the experiment is not expected.

Salmon and herring are the primary PSC species of concern in the BSAI directed pollock fishery (NMFS 2002), and are potentially impacted by the proposed action. In order to have sufficient sample sizes to support the statistical analysis, the experimental design calls for a minimum of 200 chum salmon for the first stage of EFP work and 30 chinook salmon for the chinook salmon excluder test. An "upper end" estimate for salmon mortality associated with the proposed project is 2,183 chum salmon and 217 chinook salmon. The applicant has also requested exemption from salmon bycatch management regulations establishing fishing area closures for the groundfish fisheries. The taking of salmon during the experiment is crucial for determination of the effectiveness of the excluder device. The success of the EFP work depends on the ability to conduct the experiment in areas where salmon are concentrated.

Because the harvest of salmon during the experiment will not be counted towards the salmon PSC limits for the groundfish fisheries, no effect on the level of incidental catch of salmon in the groundfish fisheries is expected under either the status quo or Alternative 2. The amount of salmon taken during the proposed experiments is also not expected to have an impact on the State commercial salmon fishery. Projections for 2003 of commercial harvest in the Central and Westward Regions are 171,000 chinook salmon and 48,530,000 chum salmon (Eggers 2003). The expected maximum harvest of salmon during the proposed experiment is less than 1 percent of the State commercial harvest. Therefore, neither the status quo nor Alternative 2 will likely have an impact on the harvest of salmon in the State commercial salmon fishery.

Although the estimated environmental effect of salmon bycatch on salmon runs in Alaska are thought to be minimal, the reduction in these effects would create some expected benefits for commercial and recreational fishermen, Alaskan natives and tribal values associated with salmon, and salmon management and conservation goals. In years where salmon returns are relatively low, the reduction in bycatch effects on salmon runs, however minimal those effects might be, would be avoided to the timely benefit of those runs.

Pacific herring are managed by the State of Alaska on a sustained yield principal. Pacific herring are surveyed each year and the Guideline Harvest Levels (GHLs) are based on an exploitation

rate of 20% of the projected spawning biomass. These GHLs may be adjusted inseason based on additional survey information to insure long term sustainable yields. The ADF&G have established minimum spawning biomass thresholds for herring stocks which must be met before a commercial fishery may occur. As shown in section 3.2.2, the amount of herring harvested overall in the pollock fishery is well below the 1 percent of biomass limit. Any potential additional harvest of herring under the proposed action is likely to be well below the one percent biomass limit for herring because of the small amount of herring that is normally taken in the pollock fishery. The EFP has no exemptions from the herring PSC limit or the Herring Savings Area closures (§ 679.21(e)(7)(vi)). No impact on herring resources is expected beyond those already analyzed (NMFS 2003).

Alternative 1: Status Quo

This alternative has no impact on the manner in which prohibited species and PSC limits are established and managed and therefore has no additional direct, indirect, or cumulative impacts on prohibited species not already considered (NMFS 2001a).

Alternative 2: Issue the EFP

The proposed action will remove salmon from the environment. As stated above, the amount of removal is very small compared to the commercial fishery which is based on conservation of the biomass of the stocks. Base on this it is unlikely that there will be any impact on the salmon stocks.

Significance criteria for potential impacts on prohibited species is described in the 2003 groundfish fishery EA (NMFS 2003, section 4.4) The benchmark used to determine the significance of effects on salmon stocks was whether or not salmon minimum escapement needs would reasonably expected to be met. If the action was reasonably not expected to jeopardize the capacity of the salmon stocks to produce long term sustainable yields it was deemed insignificant. Because the expected harvest of salmon under Alternative 2 is less than one percent of the projected harvests for the Central and Westward State commercial fisheries, the proposed action is not expected to jeopardize the capacity of the salmon stocks to produce either in the short or long term, and is therefore, not significant.

The EA (NMFS 2003) also established criteria for the harvest of prohibited species in the target fisheries with more than 50 percent of harvest in 2001 being significant. The harvest of salmon in 2001 was 95,073 fish. Projected harvest under the proposed action is 2400 fish, 2 percent of the harvest of salmon in 2001 and is therefore, not significant.

The benchmark used to determine the significance of effects under each alternative on herring stocks was whether minimum spawning biomass threshold levels would reasonably expected to be met (NMFS 2003). Under both the status quo and Alternative 2, well under 1 percent of the herring biomass is expected to be harvested, and therefore, the impact is not significant.

4.3 Effects on Endangered Species

The Steller sea lion is the only Endangered Species Act listed species that has been identified as adversely affected by the groundfish fisheries (NMFS 2001b). In order to avoid jeopardy of extinction or adverse modification or destruction of critical habitat, the Council recommended and NMFS has implemented the Steller sea lion protection measures (68 FR 204, January 2, 2003). This proposed action will be conducted in compliance with the Steller sea lion protection measures, except for the sector specific limits in the SCA (see section 2.0). Salmon and pollock have been identified as a prey species of Steller sea lions (NMFS 2001b). This proposed action will be conducted in a manner that will not likely affect prey availability for Steller sea lions. Testing will be conducted outside of protection areas (except the SCA), and the amount of groundfish and salmon harvested is expected to be very small, taken by one vessel over a large area, and dispersed over two season. Neither Alternative 1 nor Alternative 2 will have impacts on endangered species beyond those already identified for the groundfish fisheries (NMFS 2001a and 2001b).

The exemption from the sector closures of the SCA is not expected to have an impact on Steller sea lions. In 2003, almost 80,000 mt of sector combined pollock quota was left unharvested in the SCA before April 1. The amount of groundfish expected to be taken in the spring test is approximately 1,300 mt. The goal of the Steller sea lion protection measures for harvest in the SCA is to prevent the temporal concentration of harvest before April 1. This is accomplished by limiting harvest to 28% of the annual TAC. The SCA has not been closed since 1999 since the AFA allowed for the establishment of pollock coop which monitor their own fishing, generally leaving the SCA before quotas are exceeded. During 2003, the catcher vessels over 99 feet LOA harvest 101 percent of their sector's quota for the SCA. Because this sector is likely to take all of their quota and could potentially be restricted from fishing in the SCA, an exemption from the sector specific quota (the research vessel will be a greater than 99 ft LOA catcher vessel) is necessary to ensure sufficient amounts of salmon can be encountered during the experiment. (Large portions of the salmon savings areas overlap with the SCA.) This exemption will only apply as long as the combined amount of pollock taken from the SCA does not exceed the 28 percent annual TAC before April 1, as specified in the Steller sea lion protection measures (§ 679.20(a)(5)(i)(B)). Because this exemption ensure the temporal harvest of pollock remains dispersed as specified in the Steller sea lion protection measures, this exemption is not expected to have impact beyond those already identified in previous analysis (NMFS 2001b, Appendix A).

The 2003 groundfish fishery EA established that actions within the spatial and temporal concentrations established by the Steller sea lion protection measures were not significant for ESA listed species (NMFS 2003, Table 4.5-1). Because this proposed action will be implemented within compliance with the Steller sea lion protection measures, the potential impacts of this action are considered not significant.

4.4 Socioeconomic Effects

The potential socioeconomic effects of this proposed action primarily are future benefits that may result from the use of a salmon excluder device in the pollock trawl fisheries. Pollock taken during the testing will be sold to help offset the costs to the vessel operations during the experimental work. Salmon harvested during the testing will be donated for distribution under the PSDP (§ 679.26) or disposed of in accordance with § 679.21(b).

Alternative 1 Status Quo

If the EFP is not issued, the development of an effective salmon excluder device may be more difficult, if not impossible. The pollock fishery is experiencing salmon bycatch rates that have exceeded and are likely to continue to exceed salmon bycatch limits, especially for chinook salmon as the limit is reduced through 2004. The economic impact to the pollock fishery is the potential closure of salmon savings areas, limiting the choices for pollock harvest. Limited fishing grounds can result in additional expense in finding areas with sufficient catch rates and quality of fish. Alternative 1 would not facilitate the development of a salmon excluder device, eliminating the potential for future socioeconomic benefits identified under Alternative 2.

Alternative 2 Issue the EFP

Under Alternative 2, the proposed action may allow for the development of an effective salmon excluder device for trawl gear. If such a device were available, trawl vessels could use this device to lower the bycatch of salmon which would result in less potential for exceeding the PSC limits. By not exceeding the PSC limits, pollock and other trawl fisheries would have more locations available for selecting fishing grounds, potentially leading to less harvesting expense and higher quality product. Benefits to consumers and the country overall from the pollock fishery could also increase under the expectation that the benefits of efficiency gains and increased product quality would accrue to consumers and the nation.

These environmental benefits are based on the assumption of minimal injury to salmon utilizing the escapement device. Any evaluation of the performance of salmon bycatch reduction device and its costs and benefits would clearly need to explicitly evaluate the question of long term survival in order to assess actual benefit/cost tradeoffs. The expectation of benefits from a BRD also assumes that changes in fishing behavior as a result of widespread use of the device would not increase some other potential environmental costs associated with the fishery. It is also not possible to predict the level of acceptance of using such a device in the pollock trawl fishery.

4.5 Coastal Zone Management Act

Implementation of either alternative would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

5.0 SUMMARY AND CONCLUSIONS

Context: The proposed action is to issue an EFP to allow for the testing of salmon excluder devices for pollock trawl gear in the Eastern Bering Sea. Any effects of the action are limited to areas commonly used by the pollock trawl fishery. The effects on society within these areas are on individuals directly and indirectly participating in the pollock fisheries, those participating in the experiment, and those who may receive the small amount of salmon through the PSDP. Because this action may affect the efficiency of pollock fishing and the bycatch of salmon in the future, this action may have impacts on society as a whole or regionally.

Intensity: Listings of considerations to determine intensity of the impacts are in 50 CFR § 1508.27 (b) and in the NAO 216-6, Section 6. Each consideration is addressed below in order as it appears in the regulations.

Adverse or beneficial impact determinations for marine resources, **including sustainability of target and nontarget species, damage to ocean or coastal habitat or essential fish habitat, effects on biodiversity and ecosystems**, **and marine mammals**: The components of the environment that were identified to possibly be affected by the action were groundfish target species, prohibited species, marine mammals, and socioeconomic components. The analysis in section 4.0 determined that none of these components were likely to be significantly impacted by the proposed action. Future actions that may result from the successful development of a salmon excluder device may affect the socioeconomic component, but there is not enough information at this time to determine the significance of such future actions.

Public health and safety would not be affected in any way by the proposed action which is limited to the use of a catcher vessel to test a bycatch reduction device.

Cultural resources and ecologically critical areas: This proposed action would take place in the geographic area of the Bering Sea in locations commonly used by pollock catcher vessels. The land adjacent to these areas contain cultural resources and ecologically critical areas. The marine waters where the fisheries occur contain ecologically critical area. Effects on the unique characteristics of these areas are not anticipated to occur with this action because fishing practices are not affected and mitigation measures such as a bottom trawling ban in the Bering Sea are part of fisheries management measures.

Controversiality: This action is initiated by industry in cooperation with NMFS, and would reduce potential for salmon bycatch. Because it could potentially further the goals to reduce bycatch in the groundfish fisheries and does not affect current fishery regulations, it is not considered controversial.

Risks to the human environment, **including social and economic effects** are not expected with this action. The experiment is limited in scope and does not change current fishing practices. Harvest taken by the vessel would be sold to offset the cost of the experiment. The salmon taken will be provided to the donation program to feed

underprivileged individuals. The amount of harvests of pollock and salmon is very small and not likely to have an impact socially or economically.

Future actions related to this action may result in beneficial economic impacts. See section 4.6. If the testing of the salmon excluder device allowed by this action is successful, the use of such a device by pollock trawl vessels could result in economic advantages for the pollock industry. Less restrictions on pollock fishing may occur if the amount of salmon bycatch is kept under the PSC limits. Economic benefits will depend on the effectiveness of the device and the participation in using the device by trawl vessel owners. Therefore, it is not possible to determine the significance of any future beneficial economic effect.

In February 2002, the Council initiated a process to consider salmon bycatch control measures for GOA groundfish trawl fisheries. These measures may include bycatch limits that when attained, would trigger closures in areas with the historically highest bycatch rates. It is unknown if the use of an effective salmon excluder device developed for the BSAI fishery may make these protection measures unnecessary in the GOA.

Cumulatively significant impacts, **including those on target and nontarget species**, are not expected with this action. No significant impacts on the components of the environment were identified, and no past, present, or reasonably foreseeable future actions are known to combine with this action to cause a significant impact on the environment. The significance of the future action identified above regarding the use of a salmon excluder device can not be determined because of the uncertainty of the extent of use of such a device in the pollock fishery and its effectiveness.

Districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places: This action will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. This consideration is not applicable to this action.

Impact on ESA listed species and designated critical habitat: ESA listed species that range into the fishery management areas are listed in Table 3.4 of this EA. The status of Section 7 consultations is summarized in section 3.7. Based on the coded wire tag surrogate study, very few ESA listed salmon have been taken in the BSAI fishery. Because of the small amount of groundfish and salmon harvest, this action is not likely to take ESA listed salmon. It is not likely that this action will have an effect on Steller sea lions due to the very low amount of harvest of prey species by a single vessel, short duration of the action, and location of harvest outside of most Steller sea lion protection areas and maintenance of the temporal dispersion of harvest. Consultations for ESA listed marine mammals or Pacific salmon are not being reinitiated for this action because changes in fishing activities would not occur that would result in effects sufficient to trigger reinitiation. Those triggers include: (1) the amount or extent of incidental take is

exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; and (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, the action agency must immediately reinitiate formal consultation. No adverse impacts on ESA listed species or on critical habitat are likely for this proposed action.

There is no known violation of Federal, state, or local law for environmental protection with the implementation of this action.

No introduction or spread of non-indigenous species is expected with this action because the experiment is limited to a single catcher vessel in areas normally used by pollock trawl vessels.

Comparison of Alternatives and Selection of a Preferred Alternative

Alternative 1 does not meet the need or the purpose of this proposed action, to allow for implementing the experiment for salmon excluder devices on trawl gear to reduce the amount of salmon bycatch in the pollock trawl fishery. Alternative 2 would provide an EFP that permits the testing of such a device in a scientifically valid manner and within groundfish regulations (50 CFR 679 and 600), meeting the need and purpose of this proposed action. Without the EFP, the testing would not be conducted following the carefully conceived experimental design, potentially resulting in no development of the BRD. Therefore, Alternative 2 is the preferred alternative.

6.0 LIST OF PREPARERS

Melanie N. Brown, NMFS Alaska Region, Sustainable Fisheries Division

7.0 LIST OF PERSONS CONSULTED

NMFS Alaska Region, Sustainable Fisheries Division
Ben Muse
Andrew Smoker
Mary Furuness
Rance Morrison

NOAA -GC, Alaska Region , Jonathan Pollard

Alaska Department of Fish and Game, Commercial Fisheries Division
Doug Eggers

United Catcher Boats Association
John R. Gauvin

8.0 LITERATURE CITED

DeMaster, D. 2003. Memorandum to James W. Balsiger regarding review of Exempted Fishing Permit to Test Salmon Excluder, March 14, 2003. Alaska Fisheries Science Center, 7600 Sand Point Way N. E., Seattle, WA 98115-0070.

Egger, D. M. ed. 2003. Run Forecast and Harvest Projections for 2003 Alaska Salmon Fisheries and Review of the 2002 Season. Regional Information Report No. 5J03-01. Alaska Department of Fish and Game, Division of Commercial Fisheries, P. O. Box 25526, Juneau, AK 99802-5526.

Glass, C. and C. Wardle. 1995. A review of fish behavior in relation to species separation and bycatch reduction. Pages 243-250 in: Solving Bycatch: Considerations for Today and Tomorrow. Alaska Sea Grant College Program Report No. 96-03, University of Alaska Fairbanks.

Hare, S.R., and R. C. Francis. 1995. Climate change and salmon production in the Northeast Pacific Ocean. Pages 357-372 in R. J. Beamish, editor. Climate change and northern fish populations. Canadian Special Publication of Fisheries and Aquatic Sciences 121.

Hiatt, T. , R. Felthoven, and J. Terry. 2002. Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries Off Alaska, 2001. November 2002. National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

Kruse, G. H. 1998. Salmon run failures in 1997-1998: A link to anomalous ocean conditions? Alaska Fishery Research Bulletin: 5(1):55-63.

National Marine Fisheries Service (NMFS). 2003. Environmental Assessment for the Total Allowable Catch Specifications for the Year 2003 Alaska Groundfish Fisheries. January 2003. DOC, NOAA, National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

NMFS. 2002. Final Environmental Impact Statement for American Fisheries Act Amendments 61/61/13/8. February 2002. National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

NMFS. 2001a. Draft Programmatic Supplemental Environmental Impact Statement For Alaska Groundfish Fisheries Implemented Under the Authority of The Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area. January 2001. National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

NMFS. 2001b. Steller sea lion protection measures supplemental environmental impact

statement. November 2001. DOC, NOAA National Marine Fisheries Service, P.O. Box 21668, Juneau, Alaska 99802.

NMFS 2000. ESA Section 7 Consultation Biological Opinion and Incidental Take Statement. Activities Considered: Authorization of Bering Sea/Aleutian Islands groundfish fisheries based on the Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish and Authorization of the Gulf of Alaska groundfish fisheries based on the Fishery Management Plan for Groundfish of the Gulf of Alaska. November 30, 2000. NMFS Alaska Region, P. O. Box 21668, Juneau, Alaska 99802. Also available at http://www.nmfs.noaa.gov/steller/fmp_sec07-NOV30_2000_FINAL.pdf.

North Pacific Fishery Management Council NPFMC. 2002. Appendix A. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. November 2002. NPFMC, 605 W. 4th St., Suite 406, Anchorage, AK 99501. 417 pp. and appendices.

NPFMC. 1999a. Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish (updated). June 1999. NPFMC, 605 W. 4th St., Suite 406, Anchorage, AK 99501, 410 pp.

NPFMC. 1999b. Fishery Management Plan for the Gulf of Alaska Groundfish (updated). July 1999. NPFMC, 605 W. 4th St., Suite 406, Anchorage, AK 99501, 325 pp.

NPFMC. 1999c. Environmental Assessment / Regulatory Impact Review for Amendment 58: An amendment to further reduce chinook salmon bycatch in groundfish trawl fisheries of the Bering Sea and Aleutian Islands. NPFMC, 605 W. 4th St., Suite 406, Anchorage, AK 99501.

Rose, C. 2001. Development and testing of halibut excluders for Alaska cod trawling. Available from http://www.iphc.washington.edu/halcom/research/bycatch/halexcl.pdf. Alaska Fisheries Science Center, NMFS, 7600 Sand Point Way NE, Seattle, WA 98115.

United Catcher Boats Association (UCBA). 2003. An Exempted Fishing Permit Application to Test A Salmon Excluder Device for Pollock Trawls, March 2003. United Catcher Boats, 4005 20th Ave. W. Ste. 116, Fisherman's Terminal, Seattle, WA 98199.

United States Fish and Wildlife Service (USFWS). 1999. Endangered Species Act Formal Section 7 Consultation for 1999-2000 Hook-and-Line Groundfish Fisheries of the Gulf of Alaska and Bering Sea and Aleutian Islands Area (Short-tailed Albatross.) Issued March 19, 1999. U.S. Department of the Interior, Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503-6199. 36pp + Tables and Figures.

Witherell, D. and C. Pautzke. 1997. A brief history of bycatch management measures for the Eastern Bering Sea groundfish fisheries. Marine Fisheries Review 59 (4): 15-22.

Witherell, D., D. Ackley, and C. Coon. 2002. An overview of salmon bycatch in Alaska groundfish fisheries. Alaska Fishery Research Bulletin. Vol. 9, No. 1, Summer 2002.

APPENDIX A
Experimental Design

Recapture device in lieu of comparisons of modified and non-modified trawl net comparisons
The fundamental element that drives the design of this EFP test is the use of a secondary trawl webbing device to capture and account for fish that exit the trawl through the excluder device. This approach is taken in lieu of a design which sets out to compare the performance of a modified trawl (with the excluder) to an unmodified trawl. While both approaches have merit, measurement of the performance of the salmon excluder device in this test is more practical with a recapture device.

The need to structure this test around the use of a recapture device became evident when salmon bycatch data from salmon hotspots were evaluated. The data demonstrate that even if areas with relatively high bycatch rates are targeted for the experimental work, salmon bycatch would not be expected to occur consistently on each trawl tow. This was not the case in previous work to test BRDs for halibut, where it was a reasonable expectation that most trawl hauls in the Gulf of Alaska or Bering Sea will have at least some halibut bycatch and conditions affecting the probability of catching halibut on a given tow were not highly variable. In the case of this salmon excluder test, if a comparison of modified versus unmodified nets were untaken, the desired number of pairs of reasonably similar tows (pairs of tows under similar conditions) would require a prohibitive amount of experimental fishing because the relative inconsistency and rarity of salmon bycatch. For this reason, a recapture device is preferred.

Experience with experimental tests on trawl modifications raises the issue that the "recapture" device may affect the performance of the device to some degree. The manner in which this could occur is by changing the direction or magnitude of water passing through the trawl webbing (such as would not occur with the excluder alone) thus affecting the shape and function of the trawl meshes in that portion of the trawl and hence possibly affecting the probability of escapement of the bycatch or target species. The potential ramification is that the device under the test conditions with a recapture device would not function as it would be expected to perform in actual commercial fishing with the excluder but without the recapture device. Under certain conditions, performance differences with the recapture device might be in the positive or negative direction depending on the actual effect of the recapture device on the excluder portion of the trawl modification.

While it is recognized that a recapture approach to the test can pose problems for determination of the performance of the BRD, this project includes a component to evaluate the effects of the recapture device on the function of the excluder. This will be accomplished through camera devices placed in specific locations during the pre-test charter work. This will allow for adjustments in the size or placement of the recapture device to correct for recognized problems. For instance, if trawl mesh tension appears to be affected by the recapture device or if fish appear to mill around the egress point of the excluder, adjustments can be made to rectify this situation. While this approach cannot guarantee that the effects of the recapture device will be removed completely, at least by the time of the EFP experiment, steps will have been made to

reduce its effect to the extent possible.

Statistical Power To Detect An Effect

A pelagic pollock trawl is equipped with very large meshes (30 meters or greater) in the in the mouth and wings of the net which gradually taper to as little as four inch meshes in the codend. This reduction in mesh size occurs over a distance of approximately 400 meters (stretched mesh basis). Salmon and pollock can escape through the large meshes in mouth and wing sections of a pelagic net, but once they have been successfully herded back into the smaller meshes of the net, there is little chance of escapement from an unmodified trawl due to the relatively small openings.

An important consideration regarding experimental design is that once the pollock and salmon are in the small mesh sections of the trawl intermediate, there are only two possible outcomes for a net rigged with an excluder device. Specifically an individual fish (pollock or salmon) can drop back into the trawl codend or it can "escape" through the excluder, which means in this case it is retained and accounted for in the recapture device used for our experiment.

This "either/or" set of discrete outcomes is suited to statistical treatments that evaluate the probability of detecting the proportion of effect. In this case, the proportion of interest is the percentage of individual salmon escaping (desired effect of the device), thus the proportion of the total number of salmon accounted for in the recapture device relative to total number of salmon caught in the recapture device and trawl codend.

The conventional approach to determination of sample size for proportions is to generate a statistical power relationship (based on the binomial probability distribution) between sample size and statistical power to detect a given effect at a desired statistical confidence level. This relationship is normally depicted as a curve with sample size on the horizontal axis and the power of detecting a difference of a given magnitude.

Of importance is that the magnitude of the effect that is built into this sample size calculation should be designed to be useful to the research question itself. For instance, designing the sample size for the EFP test around the question of whether the excluder has any effect at all on salmon escapement is not really useful to the fishing industry that must later consider the potential tradeoffs associated with using the excluder. Because the pollock industry is faced with the very real possibility of reducing target catch rates in exchange for lowering the bycatch rate of salmon, the sample size for the experiment needs to be designed to allow detection of a performance difference of a fairly small magnitude in terms of reduction of salmon bycatch from the expected level of performance.

Sample Size Calculation

The specific goal that was selected for sample size determination to test escapement of chum salmon from the BRD is based on the number of chum salmon needed to have an 80% chance of detecting an effect that is ten percent different from the underlying or expected effect, at a 95% degree of statistical confidence. The number of salmon needed for the test essentially drives

sample size because pollock are obviously far more abundant relative to salmon. Effectively, this means that our confidence that we have correctly detected the effect of the device on pollock retention will occur long before we are confident on the question of how the BRD affects salmon escapement.

Although we have some preliminary information from Dr. Rose's video work suggesting that salmon will egress through an aperture in the top panel of a pollock net, we have no *a priori* or empirical notion of the underlying proportion of salmon that will successfully make use of the excluder developed for the test. Lacking an expectation for this underlying proportion, the risk averse approach to sample size determination (so as to avoid under-sampling) is to assume a proportion of 50%, (probability of 0.50). This, in effect, maximizes sample size for a given set of desired statistical power and desired degree of statistical confidence.

For the chum salmon escapement portion of the experiment, we assumed an underlying proportion of effect (salmon utilizing the escapement device) of 50% ($\bar{p} = 0.5$). Our goal is thus to have sufficient statistical power to have an 80% percent probability of detecting a 10% difference in proportion of effect from the underlying proportion of 0.5 with 95% statistical confidence (alpha =0.05). A statistical power curve for those criteria is reproduced in Figure 2 below.

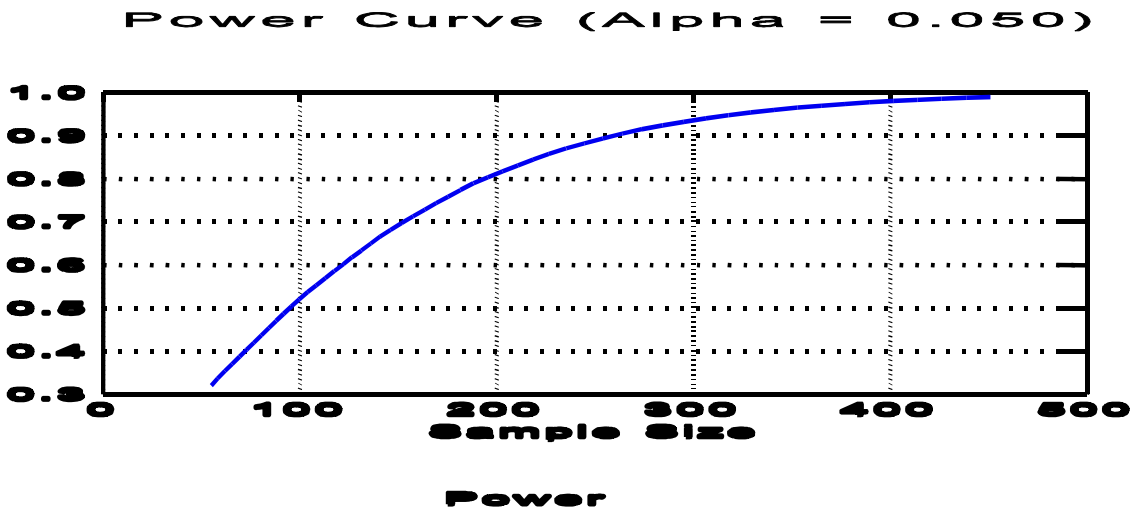


Figure 2: Probability of detecting difference from proportion of 0.6, when the underlying proportion is 0.5

Figure 2 above shows that the desired statistical power for the EFP test requires a sample size of 200 salmon. Recall that the driving factor for sample size is the number of salmon encountering the excluder. This means that for the first part of the EFP work on chum salmon, the goal would be undertake fishing that has an expectation of encountering at least 200 chum salmon.

Calculation of Pollock Catch That Would Be Expected To Generate A Sample Of Approximately 200 Chum Salmon

Because salmon are essentially a byproduct of pollock target fishing, the desired sample size of 200 chum salmon cannot be explicitly and directly generated in an EFP test for the pollock fishery. A practical means of obtaining a sample of 200 chum salmon is to estimate the quantity of pollock fishing that is likely to generate that number of chum salmon. We have done this below based on past conditions associated with chum salmon bycatch in the pollock fishery. We believe that the most reliable representation of what the fishery will encounter when the test is performed next fall is the chum salmon bycatch rates from fall of 2002. This is because strong runs of salmon tend to persist serially based on trends in ocean conditions and year class strength. Thus the most reliable approximation of the availability of chum salmon to the pollock fishery is last fall's bycatch rates. Based on that approach, the target amount of pollock catch that would be likely to achieve a sample of the desired size is derived below.

To evaluate sample size, pollock and salmon catch location-specific data were obtained on a daily basis from Sea State Inc. for the fall pollock fishery in 2002. Daily bycatch rate information on an area-specific basis was used to evaluate variation in daily chum bycatch rates in a specific area identified by Sea State Inc. as a "hotspot" for chum salmon bycatch. This approach was taken because this EFP work will utilize information on chum bycatch rates from the regular pollock fishery to target a specific area with relatively high chum salmon bycatch rates for conducting the experiment. Experience has shown that chum salmon tend to aggregate and that areas of relatively high concentrations can be identified at certain times. While certainly not static and not the only areas where chums are taken as bycatch, these areas are identifiable from the fishery bycatch reporting and management system that is now formalized into the pollock cooperative management system, which industry has agreed to make available to this project.

The goal is to focus the EFP test fishing where salmon are abundant and to plan to do enough fishing so that if bycatch rates are somewhat lower next fall or location of a relative concentration is not as effective as in past years, sufficient fishing will still take place to create a reasonably high probability of obtaining the desired sample size of chum salmon. Assuming that our success at finding an area of relatively high salmon concentration is within the range of what has occurred in the past, this approach in conjunction with somewhat modest expectations of expected bycatch rates will serve to generate the desired sample size.

Use Of Fishery Data To Estimate Bycatch Rates For The Chum Salmon EFP Test

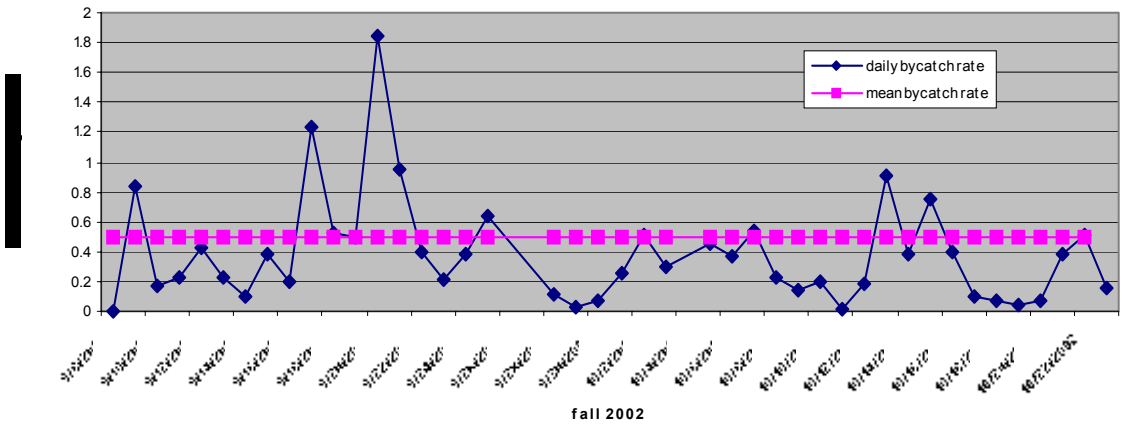
In evaluating potential chum salmon bycatch rates, the most useful data for projecting the quantity of pollock catch that would be likely to achieve the target sample size was determined to be data from catcher vessels delivering to motherships during the fall of 2002. This data source was selected for the following reasons. Portions of the Bering Sea shelf area are restricted to catcher vessel operations (Catcher Vessel Operations Area) and this area has consistently experienced relatively high chum salmon bycatch rates (Witherell and Pautzke 1997). For this reason, catcher vessel data was the most applicable for determination of expected chum salmon bycatch rate associated with a concentrated bycatch area.

In addition, for the subset of catcher vessels delivering to motherships, salmon bycatch rate data

are available on a haul by haul basis. This allows for assignment of the location and a daily rate of salmon bycatch. Data from catcher vessels delivering to shoreside plants cannot be used consistently to calculate salmon bycatch rates on a haul by haul or daily basis. This is because salmon are not systematically accounted for, in most cases, until observer sampling that occurs at the time of shoreside delivery. For shoreside delivery vessels, quantity of pollock and salmon taken over the course of the fishing trip is the most detailed level of data available. That effectively means bycatch rates for shoreside delivery vessels can only be determined over a three to four day period. During that time, a vessel may fish several different areas, with fish from all areas mixed in the vessel's holding tanks. For this reason, daily chum salmon bycatch rates from catcher vessels delivering to motherships was preferred.

Figure 3 below illustrates daily bycatch rates of chum salmon for an area identified by Sea State to have generally high chum salmon bycatch rates during the fall of 2002. Note that there are several daily periods with relatively high bycatch rates compared to the arithmetic mean rate for the total number of salmon taken by the vessels in the data set divided by the total pollock tons by these vessels. Because the EFP test must be scheduled in advance, and because it is probably unwise to assume that the EFP test will encounter peak bycatch rates, the expectation for daily salmon bycatch rate used for this calculation of pollock tons needed for the experiment was based on only the days with rates that were less than the mean daily rate during the period of data provided by Sea State (9/8/02 – 10/23/02). This removed 11 of the 42 days for which daily rates were available for catcher vessels delivering to motherships in the zone of relatively high bycatch rates from our data set.

Figure 3: Daily Chum Bycatch Rates



The above treatment of the chum salmon bycatch data attempts to balance the ability to target a chum salmon bycatch hotspots with the practical reality that timing for the EFP is not completely flexible and bycatch rates may not be as high as those peak rates encountered in the hotspots within the CVOA last fall. From the above data and the procedure used to remove all the daily rates above the mean bycatch rate, the baseline bycatch rate of 0.23 salmon per ton of pollock was used to calculate the probably amount of pollock needed to generate the desired sample size. Calculation of that expected quantity of pollock was done in the following manner: 200 (number of salmon for desired sample) divided by 0.23, or approximately 870 MT.

Based on the assumptions made above, this should be a sufficient quantity of pollock to derive a sample of 200 chum salmon for the EFP under conditions that occurred in the recent past. Another 100 MT of pollock catch is needed for the chum salmon portion of the EFP work to allow for two pre-test trawl tows with a closed codend and recapture device to ensure that the device is deploying sufficiently on trawl gear of the vessel selected for the EFP work. This brings the overall pollock catch for the chum salmon portion of the EFP to 970 MT.

Establishment Of Limits On The Amount Of Pollock Available For The EFP

The approach to derivation of sample size for the development of the chum salmon excluder portion of the EFP (and later the Chinook EFP work) was based on determination of a sufficient quantity of pollock that was expected to achieve the desired sample size. In reality, given that chum salmon catch rates vary considerably on a tow by tow basis, it is possible that a large fraction of the expected sample size could come from a few hauls during the EFP. This presents a practical consideration for the EFP test. Given that the opportunity to catch pollock outside of the total allowable catch is being used to help fund the EFP research, the EFP work must be structured around a predictable outcome for the vessel owner who is interested in applying to do the EFP work. Specifically, the applicant needs to know how many tons of pollock are available for the EFP work in order to calculate his costs and expected revenues associated with participation in the field work.

This approach of basing the EFP catch limits on the amount of target catch instead of catch of the desired number of salmon for the sampling design was done specifically to make the EFP work feasible for industry applicants. An alternative approach of conducting fishing until the target number of salmon are caught might mean that the EFP test fishing could be accomplished in a few tows or a very large number of tows with a large amount of pollock catch relative to the specified 970 MT of catch for the chum salmon excluder test. We believe the "fish until you obtain the sample" approach is simply not practical for the applicant who, in the end, has to assume the risk of undertaking all the costs of the experimental fishing associated with the EFP. Likewise, fishery managers are not likely to approve an open-ended amount of pollock for this EFP.

Our approach attempts to strike a balance between the goals of the research, the funding model for a portion of the EFP work, fishery management's need for concrete limits for consideration

of an EFP application. The actual ability of the EFP to achieve its goals for chum and Chinook salmon sample generation depends heavily on the reliability of the approaches taken to estimate sample size and associated amounts of pollock catch. We have examined other approaches to generating the desired sample size and concluded that the approach described here is reasonable (based on past experiences with EFPs) and preferable given the needs of all parties.

Sample Size For The Chinook Salmon Field Test Portion Of The EFP Work

As is explained above, differences in behavior and depth preference characteristics as well as factors relating to environmental conditions at different times of year (spring versus summer/fall) make a separate test of the salmon excluder necessary if we are to know how the excluder functions for reducing bycatch of Chinook salmon.

Following the first test of the excluder, a process involving input from fishermen will be undertaken to review potential modifications to the device based on how well it performed on chum salmon and what differences would be expected in terms of its expected performance for Chinook salmon. This process may lead to a decision to change the placement or design of the existing excluder device, or it may simply result in a decision to test the device exactly as it was deployed for the chum salmon test. In either case, the question of performance of the device should be treated as a separate question, that of "what proportion of the Chinook salmon does the (modified?) device have the desired effect upon relative to the total number of salmon that encounter the device"?

Sample Size Calculation For The Chinook Excluder Test

Unfortunately, given the relatively low expected bycatch rate for Chinook salmon even under peak bycatch timing and conditions, our ability to build statistical power into this portion of the EFP test is lower than it was for the chum salmon test. In the test for chum salmon escapement, the experiment is based upon the ability to discern as small as a 10% difference from the underlying proportion (again $\bar{p}$ is set at 0.50). After evaluating expected bycatch rates for Chinook salmon, it was obvious that this degree of statistical power is not practical for the Chinook EFP test. This is because such statistical power would mean that the EFP would have to catch as much as 8,000 MT of pollock to obtain a sample of 200 Chinook salmon.

For this pragmatic reason, a lower standard of statistical power was adopted for the Chinook salmon BRD test. Our goal for this portion of the test is to have an 80% power to detect a 25% difference from the underlying proportion of 0.50 with 95 % statistical confidence. Sample size under that set of criteria for statistical power is derived below:

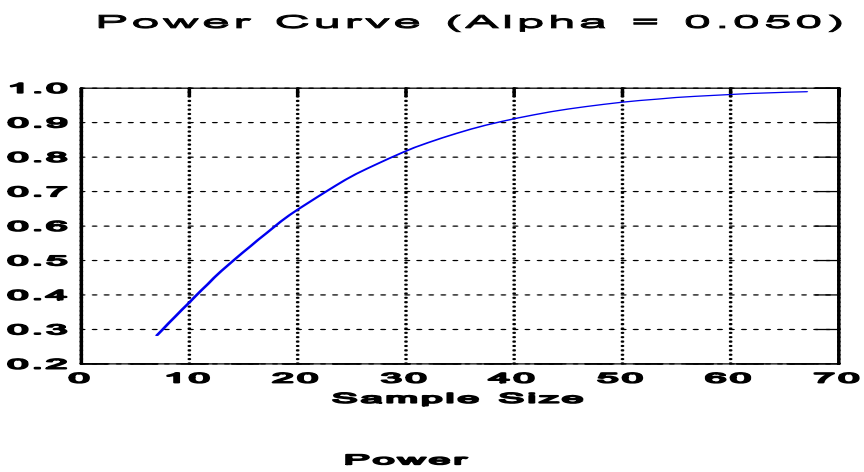


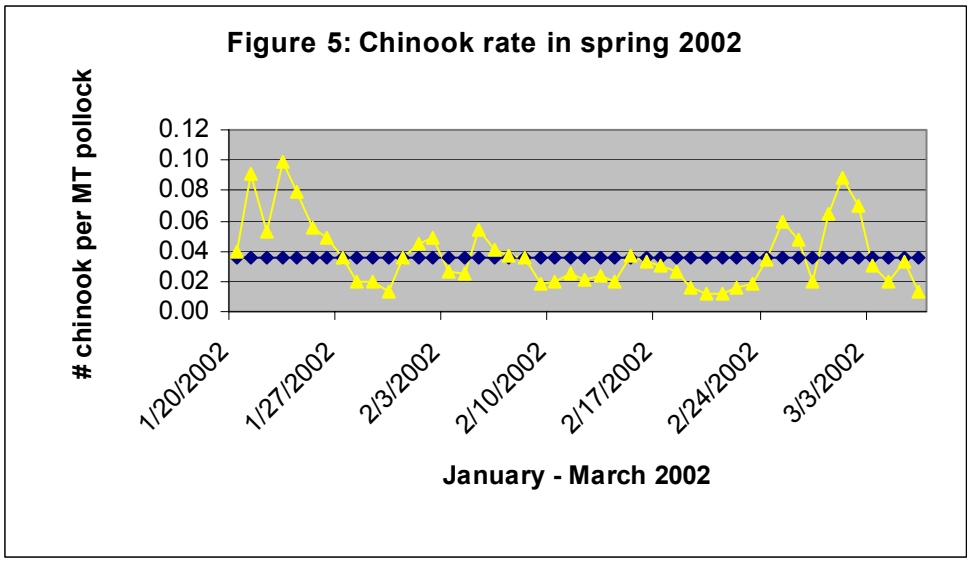
Figure 4: Probability of detecting difference from proportion of 0.75, when the underlying proportion is 0.5

Under this somewhat lower but still meaningful level of resolution to measure the effect of the excluder for releasing Chinook salmon, a sample size of 30 Chinook salmon is expected to provide an 80% probability of detecting a 25% difference from the underlying proportion of 0.50 with alpha set at 0.05 once again (see power curve above). As will be seen below, this sample size is practicable given expected bycatch rates for Chinook salmon. These bycatch rates were once again based on hotspots during the 2002 pollock fishery, this time during the spring pollock fishery.

Use Of Fishery Data To Estimate Bycatch Rates For The EFP Test

Data used to generate an expected rate of salmon bycatch for this portion of the EFP test were once again supplied by Sea State, Inc. This time, however, observed bycatch rates from a Chinook salmon hotspot were from pollock catcher processors during the spring of 2002. In the case of the spring fishery, there are no special regulatory restrictions that affect the areas where catcher processors can fish as was the case for chum salmon bycatch data. The high observer coverage on at-sea vessels fishing in the spring of 2002 makes their data highly suitable for assessing daily bycatch rates.

The same data treatments were performed on this Chinook salmon bycatch rate data as were performed above for the chum salmon data. To remove the effects of the high bycatch rates days from the data, we once again removed all the daily rates above the average (average based on the total number of salmon divided by the total tons of pollock for the period January 20, 2002 through March 6, 2002). That average rate was 0.04 Chinook per MT of pollock. This procedure to drop above-average bycatch rates removed 15 days with relatively high Chinook salmon bycatch rates from the overall number of 45 days in the data set supplied by Sea State (Figure 2 below).



From this procedure, we arrived at a "conservative" daily expected rate of 0.025 Chinook per metric ton of pollock. Once again, the purpose of this manipulation was to develop an expectation of the bycatch rate in an area with a relatively high rate but account for the possibility that the somewhat inflexible timing of the spring 2004 EFP work on Chinook salmon may not allow us to conduct the test during peak periods. If the field work for the test is able to hit a peak period, then sample size will be higher than expected and this will serve to augment the ability of the test to determine the precise effects of the excluder.

Amount Of Pollock Catch That Would Be Expected To Generate The Desired Sample Size of 30 Chinook Salmon For The Chinook Salmon Excluder

Based on the data and data manipulations described above, we calculate that 1,200 MT of pollock needs to be caught to generate a sample of 30 Chinook based on an expected bycatch rate of 0.025 Chinook per ton of pollock (30 Chinook / 0.025 Chinook per MT). Once again, the EFP work will need two pre-test hauls with the cod end and recapture device in place and to make sure the excluder is deploying reasonably for the test work. This brings the overall amount of pollock for this portion of the EFP work to 1,300 MT.

Target and incidental species harvested in the EFP work:

Groundfish: The estimated total harvest of allocated groundfish species including both the chum salmon stage of the EFP work (970 MT of pollock in fall of 2003) and the Chinook salmon stage (1,300 MT in spring of 2004) is 2,270 MT of groundfish. Approximately 98% of which is expected to be pollock and 2% is expected to be other groundfish species such as Pacific cod and flatfish. Retention standards for the EFP work will be the same as those for the directed fishery for pollock.

Pacific salmon: The determination of sample size for each species of salmon for each excluder trial is based on a target amount of pollock catch which, under the assumptions of the EFP work,

is expected to have a reasonably high probability of generating the desired sample sizes for the two stages of the EFP. To reduce the risk of "under sampling" if salmon abundance turns out to be lower than it was in the data for the period used to develop sample size calculations, only below average bycatch rates for the period covered by the fishery data used for sample size estimation were used for sample size calculations. This procedure was adopted to increase the probability that the EFP achieves its sampling goals should the EFP fishery work encounter only "below average" salmon abundance conditions in areas where pollock fishing occurs.

An "upper end" estimate for salmon mortality associated with this project is 2,183 chum salmon and 217 Chinook salmon. This estimate was made based an assessment of the highest individual vessel salmon bycatch data used for calculating sample size above. Vessel-specific chum or Chinook salmon bycatch rates (respectively) were evaluated on a weekly average basis to determine what the highest weekly rate for an individual vessel was in our data. These rates (2.25 chum salmon per ton of pollock and 0.17 Chinook per ton of pollock) were then applied to the overall quantity of pollock (including the two test tows) to produce the upper bound estimate of salmon bycatch by species discussed above.

As the Council and NMFS have approved for other EFP experiments dedicated to bycatch reduction, groundfish and prohibited species taken during the experiment should not be counted against the annual total allowable catch and prohibited species bycatch caps. The taking of salmon during the experiment is crucial for determination of the effectiveness of the excluder device. Were the salmon bycatch deducted from the respective salmon bycatch caps, the potential exists that the additional salmon bycatch during the EFP period would increase the chance that annual chum or Chinook salmon PSC limits for the pollock fishery are attained. Thus the additional salmon taken in the experiment would create a burden on the pollock trawl industry and may lead to closures of the salmon savings areas that may not otherwise have occurred. The additional amount of pollock taken in the EFP is not expected to cause the Bering Sea pollock fishery to exceed its acceptable biological catch. Pollock taken during the testing will be sold to help offset the costs to the vessel operations during the experimental work.

This application also specifically requests that a salmon bycatch limit not be set for this EFP experiment. The success of the EFP work depends on our ability to target areas with concentrations of these salmon for the benefit of the experimental work. Further, catching additional salmon will increase the ability of the EFP work to determine the effectiveness of the excluder device. Even if the upper bound estimates of salmon catch numbers for the EFP work were attained, these are relatively small numbers of mostly juvenile salmon compared to respective biomasses. We believe that the merits of the research in reducing salmon bycatch outweigh any potential effects such salmon removals associated with the EFP work might have.

Further, an exemption from salmon bycatch management regulations establishing fishing area closures for the pollock and groundfish fisheries is also requested. The current array of salmon bycatch management rules include two types of area closures. One is for areas that are closed annually on a certain date. The other are closed areas that result from attainment of a PSC cap (trigger) number of salmon. These exemptions are proposed because the success of the EFP work depends on an ability to conduct the experiment in areas where salmon are concentrated.

On-Board Sampling and Data Collection

Expectations for at-sea sampling during the EFP work need to reflect the scientific objectives of the EFP work and the practical realities of what is possible on a Bering Sea pollock catcher vessel, the most appropriate platform for the EFP work. Performance of the excluder on Bering Sea pollock catcher vessel is the initial focus of the EFP work because catcher vessels catch the majority of the pollock harvest in today's pollock fishery. Additionally, catcher vessels also have restricted access in the summer and fall pollock fishery to an area known to be a salmon bycatch hotspot, the Chum Salmon Savings Area. Recognizing the physical limitations of typical Bering Sea pollock catcher vessels, which typically range in length from 90 to 130 feet in length (LOA), the following sampling design will be used for this project, subject to adjustments during the consideration of vessel applications for the EFP work.

Variables of primary interest for deck sampling to measure the effect of salmon excluder device:

1. Number of salmon in recapture net and codend (per tow)
2. Quantity of groundfish in the recapture device and codend (per tow)
3. Length frequency of salmon in recapture device and codend (per tow)
4. Length frequency of approximately 100 pollock from cod end and recapture device (each) per tow (depending on workload issues, this may not be possible on a tow by tow basis)
5. Determination of sex of pollock taken for length frequencies from cod end and recapture device (as workload allows)

EFP vessel log information of interest for EFP work:

6. Towing speed (average speed over ground)
7. Notations on whether vessel turned around during a haul or slowed or stopped for any reason
8. Sequence and duration of hauls (date of haul, start and end time, start and end time at fishing depth and start/end times for nets towed at non-fishing depths, (such as short-hauling))
9. Area where fishing occurred (Lat/Long of tow start and end points)
10. Average depth of bottom in fishing area and average fishing depth
11. Incidental observations of captain on surface light conditions and sea state
12. Incidental observations of captain on handling issues associated with rigging of or setting/retrieving net with excluder installed

To adequately collect data for the variables of interest for the EFP work, two NMFS-certified at-sea observers may be required for the at-sea EFP work. On deck facilities of certain catcher vessels may preclude complete removal of salmon from the catch in the main codend. Such vessels may be considered for the EFP if they have multiple RSW tanks that allow separation of the catches from each haul, which would then be re-screened during offloading of the catch at processing facilities. To allow consideration of alternative sorting and sampling proposals for these vessels, proposals for one at-sea observer and one additional observer stationed at the

processing plant may be considered.

Vessels with a functional conveyor belt (or device with similar function) that can be used to transfer catches from the codend and recapture device to the holding tanks may be preferred. This could greatly facilitate removal of salmon from the pollock depending on the actual placement and function of such conveyors. Lastly, a catcher vessel with a NMFS-approved motion compensated flow scale, allowing more accurate estimation of total catch, may be preferred for the EFP work.

Data analysis will primarily focus on the estimation of the proportions of pollock and salmon excluded from the catch through the device. The experiment is designed to estimate these values for the combination of all tows, representing the value of the device in ordinary fishery conditions. Variability of escape rates between tows will be examined for indications of conditions affecting excluder performance. Combined size composition data will be tested for differences between retained and escaping fish. Video footage taken during the experiment will be reviewed to assess the physical condition of salmon that egress through the excluder into the recapture device. Results and analyses will be compiled into reports and presentations that will be made available to managers, trawlers, scientists and the interested public.

mnbrown:4/10/03
G:\FMGROUP\EFP\Permit\salmon excluder EA.wpd